

To: Auerbacher, Kevin[Auerbacher.Kevin@epa.gov]; Parikh, Pooja[Parikh.Pooja@epa.gov]; Bergman, Ronald[Bergman.Ronald@epa.gov]
From: Green, Holly
Sent: Mon 5/18/2015 5:59:04 PM
Subject: Maria's comments
[Pages from Pages from HFDWA Main Text 5-13-15 MALC.pdf ATT00001.htm](#)

Holly Sage Green
Acting Branch Chief, Prevention
Drinking Water Protection Division
USEPA
(202) 566-0651

Begin forwarded message:

From: "Lopez-Carbo, Maria" <Lopez-Carbo.Maria@epa.gov>
To: "Corr, Elizabeth" <Corr.Elizabeth@epa.gov>, "Briskin, Jeanne" <Briskin.Jeanne@epa.gov>
Cc: "Green, Holly" <Green.Holly@epa.gov>, "Kumar, Chitra" <Kumar.Chitra@epa.gov>, "Bergman, Ronald" <Bergman.Ronald@epa.gov>
Subject: RE: h-fraction doc for quick review from ORD _ DO NOT FORWARD THIS

Good Morning:

Attached is the document with my comments.

Let me know if you have any questions.

Maria A. Lopez Carbo

Branch Chief – Protection Branch

Drinking Water Protection Division

Office of Ground Water & Drinking Water

202-564-4618

From: Corr, Elizabeth
Sent: Thursday, May 14, 2015 8:06 PM
To: Briskin, Jeanne
Cc: Green, Holly; Kumar, Chitra; Bergman, Ronald; Lopez-Carbo, Maria
Subject: h-frac doc for quick review from ORD _ DO NOT FORWARD THIS

Jeanne – just picked up your v-mail and email. I’m sending the document to Holly and Chitra since they’re branch is where this is at – HF, current / future sources, etc. One of them will review your language and get back to you on whether we have issues with it.

Am also forwarding to the PWSS program Branch Chief Maria Lopez-Carbo with regard to your PWS statements.

Ex. 5

Ex. 5

Holly, Chitra, Maria – PLEASE DO NOT FORWARD THIS TO ANYONE – IT IS “CLOSE HOLD.” Where you need staff assistance, please just ask the narrow question, without providing the document. Please cc Ron and me on responses.

Jeanne -- What’s your deadline?

From: Briskin, Jeanne
Sent: Thursday, May 14, 2015 3:40 PM
To: Corr, Elizabeth

Subject:

Hi Elizabeth,

Here is the draft, close hold document I left you a voice message about. Would it be possible for you all to quickly review it and let me know if there is anything here that causes heartburn and if there are different/better citations we should be using.

Ex. 5

Ex. 5

There is about 6 pages of text total, the rest are maps, bibliography, etc.

Please let me know if you or someone could take a quick look over the next day or so.

Thanks very much,

Jeanne

To: Auerbacher, Kevin[Auerbacher.Kevin@epa.gov]
From: Patrick, Monique
Sent: Wed 5/13/2015 7:35:20 PM
Subject: RE:
HFDWA Briefing AA-RA 20150429 Final (3).pptx

From: Auerbacher, Kevin
Sent: Wednesday, May 13, 2015 3:30 PM
To: Patrick, Monique; Auerbacher, Kevin
Subject:

To: Lewis, Jen[Lewis.Jen@epa.gov]; Auerbacher, Kevin[Auerbacher.Kevin@epa.gov]; Parikh, Pooja[Parikh.Pooja@epa.gov]
Cc: Wehling, Carrie[Wehling.Carrie@epa.gov]; Michaud, John[Michaud.John@epa.gov]; Lynch, Mary-Kay[Lynch.Mary-Kay@epa.gov]
From: Swenson, Erik
Sent: Tue 5/12/2015 3:39:17 PM
Subject: RE: Draft Press Release jpv (6_lalp-5 8 15)ord.docx- deliberative

Kevin, I have no additional comments.

From: Lewis, Jen
Sent: Tuesday, May 12, 2015 11:38 AM
To: Auerbacher, Kevin; Parikh, Pooja; Swenson, Erik
Cc: Wehling, Carrie; Michaud, John; Lynch, Mary-Kay
Subject: RE: Draft Press Release jpv (6_lalp-5 8 15)ord.docx- deliberative

Ex. 5

Jen Lewis

U.S. EPA Office of General Counsel

Solid Waste and Emergency Response Law Office

(202) 564-2097

From: Auerbacher, Kevin
Sent: Tuesday, May 12, 2015 11:36 AM
To: Parikh, Pooja; Lewis, Jen; Swenson, Erik
Cc: Wehling, Carrie; Michaud, John; Lynch, Mary-Kay
Subject: RE: Draft Press Release jpv (6_lalp-5 8 15)ord.docx- deliberative

Good suggestions. Thanks.

Ex. 5

To: KeyesFleming, Gwendolyn[KeyesFleming.Gwendolyn@epa.gov]
From: Ingram, Amir
Sent: Thur 3/19/2015 7:44:23 PM
Subject: Administrator's Weekly Report- March 20, 2015
EPA FINAL Weekly Administrator's Report 03 20 15.docx

Good afternoon,

Attached, you'll find the Administrator's Weekly Report covering the period of March 20 thru March 29, 2015.

Please let us know if you have any questions or comments.

To: Smith, Kelley[Smith.Kelley@epa.gov]
Cc: Gibbons, Dayna[Gibbons.Dayna@epa.gov]; Allen, Laura[Allen.Laura@epa.gov]; Perry, Dale[Perry.Dale@epa.gov]
From: Hanley, Mary
Sent: Tue 5/12/2015 5:32:46 AM
Subject: Re: TPs

Kelley,
I shared the version that OPA shared with me to send to the EOP after coordinating with ORD.
M

Sent from my iPhone

On May 11, 2015, at 10:08 PM, Smith, Kelley <Smith.Kelley@epa.gov> wrote:

Hello Mary,

Ex. 5

KS

Sent from my iPhone

On May 11, 2015, at 9:28 PM, Hanley, Mary <Hanley.Mary@epa.gov> wrote:

Hello Dale and Laura,

Ex. 5

Thanks
Mary
Sent from my iPhone

Begin forwarded message:

From: "Vahlsing, Candace" <[REDACTED]>
Date: May 11, 2015 at 7:24:39 PM EDT
To: "Hanley, Mary" <Hanley.Mary@epa.gov>, "Marks, Teresa" <Marks.Teresa@epa.gov>

Ex. 6

Subject: RE: TPs

Just checking in on these.

Ex. 5

From: Hanley, Mary [<mailto:Hanley.Mary@epa.gov>]

Sent: Thursday, May 07, 2015 2:13 PM

To: Vahlsing, Candace

Cc: Marks, Teresa

Subject: TPs

Candace,

Per your request we will send over talking points the day before we meet with States on the HF assessment report.

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Mary

To: Hunn, Allison [Ex. 6] Blakemore,
Emily [Ex. 6]; Seidman, David [Ex. 6]
Alison_M_Grignonis [Ex. 6]
Cc: KeyesFleming, Gwendolyn [KeyesFleming.Gwendolyn@epa.gov]; Reynolds,
Thomas [Reynolds.Thomas@epa.gov]; [Administrator] Vaught,
Laura [Vaught.Laura@epa.gov]; Fritz, Matthew [Fritz.Matthew@epa.gov]; Beauvais,
Joel [Beauvais.Joel@epa.gov]; Meiburg, Stan [Meiburg.Stan@epa.gov]; Carter,
Asha [Carter.Asha@epa.gov]; Ingram, Amir [Ingram.Amir@epa.gov]; Pieh, Luseni [Pieh.Luseni@epa.gov]
From: Morales, Esther
Sent: Thur 3/12/2015 4:12:55 PM
Subject: EPA Weekly Cabinet Report 03 05 15
[150312 EPA FINAL Weekly Cabinet Report .docx](#)

Alison and team,

Please find attached EPA's Cabinet Report covering the reporting period of March 13 – 22, 2015.

Let us know if you have any additional questions!

Best,

Esther

Esther F. Morales

White House Liaison

(202) 564-3580 desk

Ex. 6

Morales.Esther@epa.gov

To: Hunn, Allison [Ex. 6]; Blakemore, Emily [Ex. 6]; Seidman, David [Ex. 6]
Alison_M_Grignon [Ex. 6]
Cc: KeyesFleming, Gwendolyn [KeyesFleming.Gwendolyn@epa.gov]; Reynolds, Thomas [Reynolds.Thomas@epa.gov]; Administrator [Ex. 6]; Vaught, Laura [Vaught.Laura@epa.gov]; Fritz, Matthew [Fritz.Matthew@epa.gov]; Beauvais, Joel [Beauvais.Joel@epa.gov]; Meiburg, Stan [Meiburg.Stan@epa.gov]; Carter, Asha [Carter.Asha@epa.gov]; Ingram, Amir [Ingram.Amir@epa.gov]; Pieh, Luseni [Pieh.Luseni@epa.gov]
From: Morales, Esther
Sent: Thur 3/5/2015 6:58:06 PM
Subject: EPA Weekly Cabinet Report 03 05 15
[EPA FINAL Weekly Cabinet Report 03 06 15.docx](#)

Alison and team,

Please find attached EPA's Cabinet Report covering the reporting period of March 6 through March 15. I'll have to send you the Travel Tracker tomorrow – as key folks are out today with that information.

Below are the main items that we are tracking for tomorrow.

Non-Responsive

Best,

Esther

Esther F. Morales

White House Liaison

(202) 564-3580 desk

Ex. 6 cell

Morales.Esther@epa.gov

To: Blakemore, Emily[Ex. 6] Seidman,
David[Ex. 6] Hunn, Allison[Ex. 6]
Alison_M_Grigonis@EPA[Ex. 6]
Cc: KeyesFleming, Gwendolyn[KeyesFleming.Gwendolyn@epa.gov]; Reynolds,
Thomas[Reynolds.Thomas@epa.gov]; Administrator Vaught,
Laura[Vaught.Laura@epa.gov]; Fritz, Matthew[Fritz.Matthew@epa.gov]; Beauvais,
Joel[Beauvais.Joel@epa.gov]; Meiburg, Stan[Meiburg.Stan@epa.gov]; Carter,
Asha[Carter.Asha@epa.gov]; Ingram, Amir[Ingram.Amir@epa.gov]; Pieh, Luseni[Pieh.Luseni@epa.gov]
From: Morales, Esther
Sent: Thur 2/26/2015 10:37:28 PM
Subject: EPA Cabinet Report 02 27 15
[EPA FINAL Weekly Cabinet Report 02 27 15.docx](#)
[150226 White House Administration Travel Tracker \(final\).xlsx](#)

All,

Please find attached EPA's Weekly Cabinet Report covering the reporting period of February 27 through March 8, 2015. Additionally, our travel tracker is attached.

Of course, please do not hesitate to contact us with questions.

Best,

Esther

Esther F. Morales

White House Liaison

(202) 564-3580 desk

Ex. 6 cell

Morales.Esther@epa.gov

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
Cc: Frithsen, Jeff[Frithsen.Jeff@epa.gov]
From: Vandenberg, John
Sent: Sun 7/12/2015 1:00:16 AM
Subject: RE: HF research and assessment - contributors and supporters

Jeanne,

This looks fine to me; quite a list!

The only thing I note is that John Stanek should be listed as lead author for Chapter 9 in column D, Row 93.

I'm not editing so you have fewer files to deal with...

John

From: Briskin, Jeanne
Sent: Friday, July 10, 2015 3:51 PM
To: Hauchman, Fred; Sonich-Mullin, Cynthia; Orme-Zavaleta, Jennifer; Vandenberg, John; Battaglia, Amy; Blancato, Jerry; Whung, Pai-Yei; Blackburn, Elizabeth
Cc: Frithsen, Jeff; Smith, Kelly; Gundlach, Mary; Gillespie, Andrew; Anderson, Van; Janowiak, Susan; Dannel, Mimi
Subject: HF research and assessment - contributors and supporters

Attached please find the updated table with names of contributors to and supporters of hydraulic fracturing research.

The first tab is for ORD employees, student contractors, ORISE, AAAS and SEE employees, with a few exceptions: detailees to ORD and those who were very high level contributors (mainly regional staff who worked intensively on our research.)

The second tab is for EPA employees not in ORD – so this would include regional and program staff, as well as relevant ORISE, AAAS, and SEE employees of non-ORD organizations.

These spreadsheets should reflect the information you provided with 2 differences:

1. I normalized the categorization for one office to put similar levels of effort and contribution in the same category
2. A new column was suggested by NRMRL to indicate lead investigators and co-authors. I took an educated guess about filling in this column. Please check my guesses and suggest any corrections for your organization.

Please send me any comments, suggestions and/or further edits by COB Wednesday July 15.

The next step will be to provide the entire list to Tom Burke for his information and to use the list of names (without more detailed information regarding contribution) as a starting point for communicating regarding records management for the hydraulic fracturing research endeavor.

Thanks for your contributions and patience as we pulled this together.

Jeanne

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
From: Yohannes, Lia
Sent: Fri 7/10/2015 7:39:03 PM
Subject: RE: American Chemical Society Chapter revision 070615.docx
American Chemical Society Chapter revision 070615 ly.docx

Hi Jeanne,

Thanks for the opportunity to review. It looks great! Much value added with the concluding remarks and references you included. Just caught a minor typo, revision attached.

We're looking forward to Sunday as well!

Lia

From: Briskin, Jeanne
Sent: Friday, July 10, 2015 1:56 PM
To: Yohannes, Lia
Subject: American Chemical Society Chapter revision 070615.docx

Here is the revised chapter which responds to comments from the reviewer and editor. In particular, I drew from the talking points and the executive summary to include the top line results of the assessment. How does this look to you?

I will send the comments next so you can see what they were.

Looking forward to seeing you guys on Sunday!

Jeanne

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
From: Frithsen, Jeff
Sent: Fri 7/10/2015 2:00:17 PM
Subject: Automatic reply: Updated Talking Points on Draft HF assessment

I will be out of the office until [Ex. 6] Until then, I may not be able to answer your email promptly. If your need is urgent, please call my cell phone, [Ex. 6]

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
From: Smith, Kelly
Sent: Thur 7/9/2015 10:53:12 AM
Subject: RE: HF Research and Assessment - contributors and supporters 062515.xlsx
HF Research and Assessment - contributors and supporters 07082015 NRMRL.xlsx

Hi Jeanne,

See attached list, changes or additions are highlighted. Please note we added a third, higher category for level of contribution which we calling **Lead Investigator/Co-PI**. I'm not sure at this time if you want to break it down any futher than the 2 original categories so let me know.

Thanks,

Kelly

From: Briskin, Jeanne
Sent: Tuesday, July 07, 2015 12:13 PM
To: Smith, Kelly
Subject: RE: HF Research and Assessment - contributors and supporters 062515.xlsx

Hi Kelly,

Do you think you'll be able to finish this up this week?

Thanks!

Jeanne

From: Briskin, Jeanne

Sent: Wednesday, July 01, 2015 2:14 PM
To: Smith, Kelly
Subject: RE: HF Research and Assessment - contributors and supporters 062515.xlsx

Thanks Kelly.

At this point, yes, early next week is fine. Feel free to change my guesses as you see fit.

From: Smith, Kelly
Sent: Wednesday, July 01, 2015 2:12 PM
To: Briskin, Jeanne; Sonich-Mullin, Cynthia
Subject: RE: HF Research and Assessment - contributors and supporters 062515.xlsx

Hi Jeanne,

Cindy is out this week but I can take a look. I will want to discuss with Cindy before we send it back. When do you need it by? Is next week okay?

Kelly

From: Briskin, Jeanne
Sent: Wednesday, July 01, 2015 2:09 PM
To: Sonich-Mullin, Cynthia
Cc: Smith, Kelly
Subject: FW: HF Research and Assessment - contributors and supporters 062515.xlsx

Hi Cindy,

Hope you're doing well and planning to take it easy this long weekend.

Any sense of when/if you might get to this? I'm sorry I'm not familiar enough with everyone on your team to have been able to make a recommendation for them all.

Thanks,

Jeanne

From: Briskin, Jeanne

Sent: Friday, June 26, 2015 8:05 AM

To: Cynthia Sonich-Mullin (Sonich-Mullin.Cynthia@epa.gov)

Subject: HF Research and Assessment - contributors and supporters 062515.xlsx

Hi Cindy,

Thanks for reviewing this list. Take a look at the tab labeled NRMRL estimate. The goals are:

1. Make sure no one is omitted --

We are including: EPA staff past and present, including non-ORD; student contractors (but no other contractors); ORISE and AAAS fellows, and SEE grantees. Please let me know if there are any other categories to think about.

2. Indicate which folks had a high level of contribution (in terms of time, effort, etc put into the HF endeavor.) For an extreme example, if a person made a brilliant but 1 hour contribution, that would be considered to not be high.

I put a best guess for the folks I was familiar with. A couple have question marks that require your judgement. I had no idea what to suggest for the folks who I left blank.

Thanks for your input!

Hope you're getting to enjoy summer a bit.

Jeanne

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
Cc: Cluff, Maryam[Cluff.Maryam@epa.gov]
From: Singer, Alison
Sent: Mon 7/6/2015 7:44:21 PM
Subject: Summary of Impacts table
[Summary of impacts 07 6 15.xlsx](#)

Hi Jeanne – we’ve made some changes to the impacts table. As you can see, we’ve added an “addl details” tab that provides more information about the specific documented impacts, including full citations and more information from the original source material when possible. We also added a tab for the spills appendix and another for a table with multiple spills from the Brantley paper. These are both indicated in the addl details tab. This organizational scheme makes sense to us, but certainly adjust if you think it isn’t user-friendly enough!

Thanks,

Alison Singer

Student Contractor

Office of Science Policy

Office of Research and Development

U.S. Environmental Protection Agency

(202) 564-2177

singer.alison@epa.gov

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
Cc: Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]; Anderson, Van[Anderson.Van@epa.gov]
From: Gillespie, Andrew
Sent: Thur 6/25/2015 1:02:03 AM
Subject: FW: Please review and respond by 6/24 regarding list of staff who contributed to HF research
[ag HF Research and Assessment - contributors and supporters 061815.xlsx](#)

Here is NERLs response.
Let Van know if you have questions.

Andrew J. R. Gillespie, Ph. D.
Associate Director
US EPA Office of Research and Development
National Exposure Research Laboratory

From: Briskin, Jeanne<mailto:Briskin.Jeanne@epa.gov>
Sent: 6/19/2015 14:49
To: Orme-Zavaleta, Jennifer<mailto:Orme-Zavaleta.Jennifer@epa.gov>; Sonich-Mullin, Cynthia<mailto:Sonich-Mullin.Cynthia@epa.gov>; Vandenberg, John<mailto:Vandenberg.John@epa.gov>; Whung, Pai-Yei<mailto:Whung.Pai-Yei@epa.gov>; Blancato, Jerry<mailto:Blancato.Jerry@epa.gov>; Battaglia, Amy<mailto:Battaglia.Amy@epa.gov>; Hauchman, Fred<mailto:hauchman.fred@epa.gov>
Cc: Anderson, Van<mailto:Anderson.Van@epa.gov>; Smith, Kelly<mailto:Smith.Kelly@epa.gov>; Frithsen, Jeff<mailto:Frithsen.Jeff@epa.gov>; Gundlach, Mary<mailto:Gundlach.Mary@epa.gov>; Janowiak, Susan<mailto:Janowiak.susan@epa.gov>; Kasper, Sandy<mailto:Kasper.Sandy@epa.gov>; Dannel, Mimi<mailto:Dannel.Mimi@epa.gov>; Briskin, Jeanne<mailto:Briskin.Jeanne@epa.gov>
Subject: Please review and respond by 6/24 regarding list of staff who contributed to HF research

Attached is a draft list of people in EPA who participated in and contributed to ORD's hydraulic fracturing research efforts. Please review and respond to the 3 requests listed below. Please reply all, as this may make it easier to normalize both the descriptions of contributions and the designation of level of contributions.

There are two purposes for the list. First, this will be useful for recognition. Tom is planning to visit the many ORD locations and this information will allow him to better appreciate individuals' accomplishments. The list also will help if additional types of recognition are pursued.

Second, the list is a useful resources so that we can reach out appropriately regarding records management.

By COB Wednesday June 24, please:

1. Make sure the list is complete. Add anyone who is missing. We would hate to accidentally omit someone
2. Review the description of each person's contribution and update if needed. You will note that some standardization of roles and contributions has been attempted, but it is not rigid.
3. For each person in your lab, center or office, designate whether their contribution was at a "high" level or not. We decided to have just 2 categories.

Additional information to help your review:

Who is included? The list is intended to include

- * EPA employees in ORD (tab 1, includes detailees from regions and offices to ORD) and
- * Folks from programs and regions (tab 2).
- * The list includes student contractors but not other contractors; SEE, ORISE, AAAS folks.

What contributions/activities are included?

- * All types of contributions (technical, writing, data gathering, field work, review, communications, administrative)
- * All aspect and stages of the work (such as planning, research projects and reports and the assessment)

You will note that the list does include LCO directors, but not AA/DAA level folks.

The formatting and polishing the list will continue to evolve and improve. At this point the value is in getting your feedback sooner rather than later.

thanks for your feedback. Please let me know if you have any questions or concerns.

Jeanne

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
From: Gundlach, Mary
Sent: Wed 6/24/2015 7:00:48 PM
Subject: HF Research and Assessment List
[Copy of HF Research and Assessment - contributors and supporters 061815 \(4\).xlsx](#)

Copy of ORD/OPARM's HF R&D contributors as requested.

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
From: Gundlach, Mary
Sent: Wed 6/24/2015 6:54:52 PM
Subject: Copy of HF Research and Assessment - contributors and supporters 061815 (4).xlsx
Copy of HF Research and Assessment - contributors and supporters 061815 (4).xlsx
Copy of HF Research and Assessment - contributors and supporters 061815 (4).xlsx

To: Smith, Kelley[Smith.Kelley@epa.gov]
Cc: Deener, Kathleen[Deener.Kathleen@epa.gov]; Hauchman, Fred[hauchman.fred@epa.gov]; Dannel, Mimi[Dannel.Mimi@epa.gov]; Washburn, Edward[Washburn.Edward@epa.gov]; Slimak, Michael[Slimak.Michael@epa.gov]; Geller, Andrew[Geller.Andrew@epa.gov]; Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Matthews, Lisa[Matthews.Lisa@epa.gov]; Frithsen, Jeff[Frithsen.Jeff@epa.gov]
From: Rodia, Monica
Sent: Fri 6/19/2015 6:11:17 PM
Subject: Final Materials for National Tribal Operations Committee (NTOC) Meetings Next Week in DC: June 23 and June 25
[NTC 6 23 Meeting Agenda.docx](#)
[Complete 2015 NTOC Materials.pdf](#)
[EPA NTC FY 2017 Budget Request and Priority Document Draft \(6 12 15\).docx](#)
[NTOC June 2015 ORD one-pager.docx](#)
[FedPrepInitiativesForCrudeOilPacket for Tribes.pdf](#)
[Swinomish Bomb Trains.pdf](#)
[SHC Tribal Research.docx](#)
[NCER Tribal Grants.docx](#)

Hi Kelly,

Attached are the final NTOC materials that the American Indian Environmental Office asked me to share with ORD senior management for the meetings that will be held next week. On Tuesday, June 23, members of ORD's fracking team will meet with the National Tribal Caucus to discuss the draft assessment of the potential impacts to drinking water resources from hydraulic fracturing. The Tuesday agenda is included for your information. On Thursday, June 25 from 9 am to 2:00 pm, the full NTOC (both EPA and Tribal leadership) will meet with Administrator McCarthy according to the agenda. Please remember there is a working lunch (per our discussion, I ordered Tom the vegetarian lunch box – the cost is \$15 payable at the sign-in table).

The background materials to prepare Tom for the meeting are attached as well as a one-pager I have developed on ORD activities related to the discussion topic on Technical Assistance to Tribes. I will provide you with the meeting notebook for Tom later today or Monday morning.

Thank you and I am available next week if you have any questions.

Monica

Monica L. Rodia

US EPA Office of Research and Development (ORD)
Office of Science Policy
Executive Secretary, Tribal Science Council
ORD Senior Indian Program Manager
Mail code 8104R
202.564.8322 (tel)
202.565.2925 (fax)
<http://www.epa.gov/osp/tribes.htm>

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Ridley, Caroline[Ridley.Caroline@epa.gov]
Cc: Frithsen, Jeff[Frithsen.Jeff@epa.gov]
From: LeDuc, Stephen
Sent: Thur 6/18/2015 5:45:04 PM
Subject: RE: list of assessment team members
[HF Assessment Contributors and Supporters 20150618.xlsx](#)

Jeanne,

Caroline and I put this together. Please let me know if you need more information or in a different format. We put our contact information for most people since we have a good idea of how everyone contributed to the assessment. Best, Steve

From: Briskin, Jeanne
Sent: Tuesday, June 16, 2015 2:32 PM
To: LeDuc, Stephen; Ridley, Caroline
Cc: Frithsen, Jeff
Subject: RE: list of assessment team members

Thank you!

From: LeDuc, Stephen
Sent: Tuesday, June 16, 2015 2:30 PM
To: Briskin, Jeanne; Ridley, Caroline
Cc: Frithsen, Jeff
Subject: RE: list of assessment team members

Jeanne,

We are working on this and will get something back to you by COB Thursday. Best, Steve

From: Briskin, Jeanne
Sent: Tuesday, June 16, 2015 8:40 AM
To: Ridley, Caroline; LeDuc, Stephen
Cc: Frithsen, Jeff
Subject: list of assessment team members

Hi Caroline and Steve,

Jeff asked me to put together a list of all the EPA contributors to the HF study, including the assessment. I have responses from everyone but Jeff :) John Vandenberg provided some names from NCEA, but not the full assessment team.

Would you please fill out and return the attached spreadsheet? (I have provided the response that John did and you can add more names)

I would like to have the completed document available when he returns next week, so If you can provide **a response before COB Thursday 6/18** it would be very helpful.

Please include all ORD participants, plus any writers, researchers , peer reviewers, and authors from other EPA offices on the first tab. (for example, in OSP, I include Nathan Wiser whose home office is R8 on the first tab) Please include peer reviewers or other types of contributions from non-ORD organizations on the second tab. Please note if the person has left EPA or ORD.

We are including: student contractors, ORISE fellows, EPA interns, SEEs. We are not including contractors other than student contractors.

Please let me know if you have any questions.

Thanks for your help,

Jeanne

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
Cc: Sonich-Mullin, Cynthia[Sonich-Mullin.Cynthia@epa.gov]
From: Smith, Kelly
Sent: Wed 6/10/2015 4:20:41 PM
Subject: RE: Recognize your organization's contribution to hydraulic fracturing research
[Copy of HF Research and Assessment - contributors and supporters 060115.xlsx](#)

Hello Jeanne,

Attached is our most updated list.

Kelly

To: Sonich-Mullin, Cynthia[Sonich-Mullin.Cynthia@epa.gov]; Zambrana, Jose[Zambrana.Jose@epa.gov]; Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Kavlock, Robert[Kavlock.Robert@epa.gov]; Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]
From: Matthews, Lisa
Sent: Wed 6/10/2015 2:30:09 PM
Subject: FW: HFDWA: Presentation for Technical Roundtable
[HFDWA Release Briefing 20150610.pptx](#)

From: Frithsen, Jeff
Sent: Wednesday, June 10, 2015 10:03 AM
To: Matthews, Lisa; Bueno, Michael; Gibbons, Dayna
Subject: HFDWA: Presentation for Technical Roundtable

Attached is the revised presentation for today's technical roundtable. See you all this afternoon for another exciting event!

Jeff

Jeffrey B. Frithsen, Ph.D.

National Center for Environmental Assessment

Office of Research and Development

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue, SW (8623-P)

Washington, DC 20460

703-347-8623 (office phone)

Physical Office Address/Overnight Deliveries

Two Potomac Yard (North Building), Room N-7741

2733 South Crystal Drive, Arlington, VA 22202

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
Cc: Sonich-Mullin, Cynthia[Sonich-Mullin.Cynthia@epa.gov]
From: Smith, Kelly
Sent: Tue 6/9/2015 3:59:37 PM
Subject: RE: Recognize your organization's contribution to hydraulic fracturing research
[Copy of HF Research and Assessment - contributors and supporters 060115.xlsx](#)

Hi Jeanne,

Attached is the most currently list I have.

Thanks

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]
From: Smith, Kelly
Sent: Mon 6/8/2015 4:11:13 PM
Subject: RE: Recognize your organization's contribution to hydraulic fracturing research
Copy of HF Research and Assessment - contributors and supporters 060115.xlsx

I few changes

From: Smith, Kelly
Sent: Monday, June 08, 2015 11:49 AM
To: Briskin, Jeanne
Cc: Frithsen, Jeff; Sonich-Mullin, Cynthia
Subject: RE: Recognize your organization's contribution to hydraulic fracturing research

Hello Jeanne,

Attached is the first cut at the NRMRL list. Please note, I have sent this out to make sure I didn't miss anyone. I will send any changes ASAP.

Thanks,

Kelly

From: Briskin, Jeanne
Sent: Monday, June 08, 2015 11:18 AM
To: Hauchman, Fred; Orme-Zavaleta, Jennifer; Sonich-Mullin, Cynthia; vanDrunick, Suzanne; Vandenberg, John; Battaglia, Amy; Blancato, Jerry; Whung, Pai-Yei; Hubbard, Carolyn; Blackburn, Elizabeth
Cc: Smith, Kelly; Frithsen, Jeff; Terry, Joyce; Watkins, Tim; Dannel, Mimi
Subject: RE: Recognize your organization's contribution to hydraulic fracturing research

Reminder: If you have not already sent me your list of folks who contributed to the HF work, please send it today.

Thanks!

Jeanne

From: Briskin, Jeanne
Sent: Thursday, June 04, 2015 2:19 PM
To: Hauchman, Fred; Orme-Zavaleta, Jennifer; Cynthia Sonich-Mullin (Sonich-Mullin.Cynthia@epa.gov); vanDrunick, Suzanne; Vandenberg, John; Battaglia, Amy; Blancato, Jerry; Whung, Pai-Yei; Hubbard, Carolyn; Blackburn, Elizabeth
Cc: kelly smith (Smith.Kelly@epa.gov); Frithsen, Jeff; Terry, Joyce; Watkins, Tim; Dannel, Mimi
Subject: RE: Recognize your organization's contribution to hydraulic fracturing research

Since I sent out this request, I've learned that we need the information much sooner than the end of next week. Sorry for the changed deadline, but if you would send me the requested information by noon Monday 6/11 I would appreciate it.

Thanks,

Jeanne

From: Briskin, Jeanne
Sent: Monday, June 01, 2015 12:23 PM
To: Hauchman, Fred; Orme-Zavaleta, Jennifer; Cynthia Sonich-Mullin (Sonich-Mullin.Cynthia@epa.gov); vanDrunick, Suzanne; Vandenberg, John; Battaglia, Amy; Blancato, Jerry; Whung, Pai-Yei; Hubbard, Carolyn; Blackburn, Elizabeth
Cc: kelly smith (Smith.Kelly@epa.gov); Frithsen, Jeff; Terry, Joyce; Watkins, Tim; Dannel, Mimi
Subject: Recognize your organization's contribution to hydraulic fracturing research

This note follows up on my phone message. Jeff and I are looking to provide to Tom a list of the names of folks who contributed to ORD's hydraulic fracturing effort over the years. We realize that there are many who may have worked on hydraulic fracturing early on but not recently, and that there are many important roles in addition to writing papers and reports,

including field and laboratory technicians, quality assurance, budget, IT and administrative support, etc. Attached is a spreadsheet to use to provide the information regarding the name, affiliation and role of each participant. We envision that Tom may use this when he comes to visit each ORD location in order to recognize contributors.

Please return your completed spreadsheet to me no later than Friday June 12. Please let me know if I have accidentally omitted anyone to whom this should be sent. Please contact me if you have any questions or concerns.

Thanks,

Jeanne

Jeanne Briskin

Hydraulic Fracturing Research Coordinator

US Environmental Protection Agency

202 564-4583

Mailing Address:

1200 Pennsylvania Ave NW

MC 8104R

Washington, DC 20460

Local Address (for deliveries):

Ronald Reagan Building

Room 51144

1300 Pennsylvania Ave NW

Washington DC 20004

To: Hanley, Mary[Hanley.Mary@epa.gov]; Perry, Dale[Perry.Dale@epa.gov]; Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Gibbons, Dayna[Gibbons.Dayna@epa.gov]; Matthews, Lisa[Matthews.Lisa@epa.gov]; Teichman, Kevin[Teichman.Kevin@epa.gov]; Zambrana, Jose[Zambrana.Jose@epa.gov]
From: Frithsen, Jeff
Sent: Thur 6/4/2015 12:33:40 PM
Subject: HFDWA: Briefing slides
HFDWA Release Briefing 20150604.pptx

See attached for briefing slides.

Jeff

Jeffrey B. Frithsen, Ph.D.

National Center for Environmental Assessment

Office of Research and Development

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue, SW (8623-P)

Washington, DC 20460

703-347-8623 (office phone)

Physical Office Address/Overnight Deliveries

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2733 South Crystal Drive, Arlington, VA 22202

To: Allen, Laura[Allen.Laura@epa.gov]; Purchia, Liz[Purchia.Liz@epa.gov]; Perry, Dale[Perry.Dale@epa.gov]
Cc: Frithsen, Jeff[Frithsen.Jeff@epa.gov]; Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Maloney, Kelsey[Maloney.Kelsey@epa.gov]; Maloney, Kelsey[Maloney.Kelsey@epa.gov]; Hubbard, Carolyn[Hubbard.Carolyn@epa.gov]; Maguire, Megan[Maguire.Megan@epa.gov]
From: Gibbons, Dayna
Sent: Wed 6/3/2015 9:59:41 PM
Subject: QAs and case study messages etc
[Press HF study QAs6.3 15.docx](#)
[Case Studies QA June3.docx](#)
[Killdeer ND report communications package 6 03.docx](#)
[NEPA report communications package 6 03.docx](#)
[Overarching Conclusion and individual Bullets for the Five Retrospective Case Studies v11.docx](#)
[Raton Basin report communications package 6 03.docx](#)
[SWPA report communications package 6 03.docx](#)
[Wise County report communications package 6 03.docx](#)

202-564-7983

gibbons.dayna@epa.gov

Communications

Office of Research and Development

U.S. Environmental Protection Agency

To: Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Frithsen, Jeff[Frithsen.Jeff@epa.gov]; Shari.Ring@
From: Ridley, Caroline
Sent: Wed 6/3/2015 3:39:54 PM
Subject: RE: HFDWA Impact locations.docx
HFDWA Impact locations_CR.docx

Tried to do a better job with wastewater section with sentences from ES.

~~~~~  
Caroline E. Ridley, PhD

Ecologist

US Environmental Protection Agency

Office of Research and Development

National Center for Environmental Assessment

Office: (703) 347-8506 and AWL (Fridays): (703) 362-5955

**From:** Briskin, Jeanne  
**Sent:** Wednesday, June 03, 2015 11:36 AM  
**To:** Frithsen, Jeff; Shari.Ring; Ridley, Caroline  
**Subject:** HFDWA Impact locations.docx

A few edits/questions

**To:** Ridley, Caroline[Ridley.Caroline@epa.gov];

Shari.Ring;

Jeanne[Briskin.Jeanne@epa.gov]

Ex. 4

**From:** Frithsen, Jeff

**Sent:** Wed 6/3/2015 3:26:11 PM

**Subject:** FW: HFDWA: Impact Locations

[HFDWA Impact locations.docx](#)

Comment on approach?

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**To:** Frithsen, Jeff[Frithsen.Jeff@epa.gov]  
**Cc:** Smith, Kelley[Smith.Kelley@epa.gov]; Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Zambrana, Jose[Zambrana.Jose@epa.gov]; Teichman, Kevin[Teichman.Kevin@epa.gov]; Hubbard, Carolyn[Hubbard.Carolyn@epa.gov]  
**From:** Gibbons, Dayna  
**Sent:** Thur 5/7/2015 4:31:23 PM  
**Subject:** Messaging for the assessment-- Please read-- need your feedback by COB today

**Ex. 5**

Thanks

202-564-7983

[gibbons.dayna@epa.gov](mailto:gibbons.dayna@epa.gov)

Communications

Office of Research and Development

U.S. Environmental Protection Agency



**To:** Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Teichman, Kevin[Teichman.Kevin@epa.gov]; Gibbons, Dayna[Gibbons.Dayna@epa.gov]; Zambrana, Jose[Zambrana.Jose@epa.gov]; Matthews, Lisa[Matthews.Lisa@epa.gov]  
**From:** Friithsen, Jeff  
**Sent:** Thur 5/7/2015 11:45:31 AM  
**Subject:** Schedule for release of HF Study Reports and Draft Assessment

FYI: I sent the following to Jennifer, Cindy, and Fred this morning.

May promises to be a very busy month for ORD and for the Agency. There are lots of activities coming to completion not only in our world of hydraulic fracturing, but in other parts of the Agency as well. Scheduling all those activities has become a bit of a challenge.

**Ex. 5**

**Ex. 5**

Thanks all! Almost there. Really!!

Jeff

**To:** Briskin, Jeanne[Briskin.Jeanne@epa.gov]  
**From:** Hauchman, Fred  
**Sent:** Wed 5/6/2015 4:31:41 PM  
**Subject:** RE: DRAFT press release -- Please review by tomorrow noon.

Thanks. This looks fine to me.

**From:** Briskin, Jeanne  
**Sent:** Wednesday, May 06, 2015 9:53 AM  
**To:** Hauchman, Fred  
**Subject:** FW: DRAFT press release -- Please review by tomorrow noon.

FYI

**From:** Briskin, Jeanne  
**Sent:** Wednesday, May 06, 2015 8:57 AM  
**To:** Gibbons, Dayna; Hubbard, Carolyn; Frithsen, Jeff; Zambrana, Jose; Teichman, Kevin; Matthews, Lisa; Burke, Thomas  
**Cc:** Maguire, Megan; Maloney, Kelsey; Smith, Kelley  
**Subject:** RE: DRAFT press release -- Please review by tomorrow noon.

Here are some suggested edits that clarify the uncertainties in our work and correct a few points.

**From:** Gibbons, Dayna  
**Sent:** Tuesday, May 05, 2015 4:41 PM  
**To:** Hubbard, Carolyn; Frithsen, Jeff; Briskin, Jeanne; Zambrana, Jose; Teichman, Kevin; Matthews, Lisa; Burke, Thomas  
**Cc:** Maguire, Megan; Maloney, Kelsey; Smith, Kelley  
**Subject:** DRAFT press release -- Please review by tomorrow noon.

This is the first step for OPA. I plan to send to them tomorrow. If there are any deal breakers here please let me know.

Thanks!

**Draft Press Release**

**Ex. 5**

# Ex. 5

202-564-7983

[gibbons.dayna@epa.gov](mailto:gibbons.dayna@epa.gov)

Communications

Office of Research and Development

U.S. Environmental Protection Agency

**To:** Frithsen, Jeff[Frithsen.Jeff@epa.gov]; Matthews, Lisa[Matthews.Lisa@epa.gov]; Sonich-Mullin, Cynthia[Sonich-Mullin.Cynthia@epa.gov]; Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]; Hauchman, Fred[hauchman.fred@epa.gov]; Briskin, Jeanne[Briskin.Jeanne@epa.gov]; Gibbons, Dayna[Gibbons.Dayna@epa.gov]; Teichman, Kevin[Teichman.Kevin@epa.gov]  
**Cc:** Smith, Kelley[Smith.Kelley@epa.gov]; Smith, Kelly[Smith.Kelly@epa.gov]  
**From:** Zambrana, Jose  
**Sent:** Tue 5/5/2015 5:44:09 PM  
**Subject:** RE: HF: revised Preface for HF Reports

Hi all. As mentioned on our call today, if we can get approval from up the chain on this, then it can be finalized and sent out to the L/C/O's ASAP.

jose

**From:** Frithsen, Jeff  
**Sent:** Tuesday, May 05, 2015 5:51 AM  
**To:** Matthews, Lisa; Sonich-Mullin, Cynthia; Orme-Zavaleta, Jennifer; Hauchman, Fred; Briskin, Jeanne; Gibbons, Dayna; Teichman, Kevin; Zambrana, Jose  
**Cc:** Smith, Kelley; Smith, Kelly  
**Subject:** RE: HF: revised Preface for HF Reports

**Ex. 5**

Jeff

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**From:** Matthews, Lisa  
**Sent:** Tuesday, May 05, 2015 8:46 AM  
**To:** Frithsen, Jeff; Sonich-Mullin, Cynthia; Orme-Zavaleta, Jennifer; Hauchman, Fred; Briskin, Jeanne; Gibbons, Dayna; Teichman, Kevin; Zambrana, Jose  
**Cc:** Smith, Kelley; Smith, Kelly  
**Subject:** RE: HF: revised Preface for HF Reports

# Ex. 5

**From:** Frithsen, Jeff  
**Sent:** Tuesday, May 05, 2015 8:41 AM  
**To:** Sonich-Mullin, Cynthia; Orme-Zavaleta, Jennifer; Hauchman, Fred; Briskin, Jeanne; Gibbons, Dayna; Matthews, Lisa; Teichman, Kevin; Zambrana, Jose  
**Cc:** Smith, Kelley; Smith, Kelly  
**Subject:** HF: revised Preface for HF Reports

Please see the attached. I suggest using this revised preface for the nine HF study reports.

I will need to run by a few folks this morning. However, let me know what you think.

# Ex. 5

Jeff

Jeffrey B. Frithsen, Ph.D.

National Center for Environmental Assessment

Office of Research and Development

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue, SW (8623-P)

Washington, DC 20460

703-347-8623 (office phone)

Physical Office Address/Overnight Deliveries

Two Potomac Yard (North Building), Room N-7741

2733 South Crystal Drive, Arlington, VA 22202

**To:** Lopez-Carbo, Maria[Lopez-Carbo.Maria@epa.gov]  
**Cc:** Corr, Elizabeth[Corr.Elizabeth@epa.gov]; Green, Holly[Green.Holly@epa.gov]; Kumar, Chitra[Kumar.Chitra@epa.gov]; Bergman, Ronald[Bergman.Ronald@epa.gov]  
**From:** Briskin, Jeanne  
**Sent:** Fri 5/15/2015 10:48:21 AM  
**Subject:** Re: h-frac doc for quick review from ORD \_ DO NOT FORWARD THIS

Thank you so much for the really quick review!

Jeanne

On May 15, 2015, at 6:36 AM, Lopez-Carbo, Maria <[Lopez-Carbo.Maria@epa.gov](mailto:Lopez-Carbo.Maria@epa.gov)> wrote:

Good Morning:

Attached is the document with my comments.

Let me know if you have any questions.

Maria A. Lopez Carbo

Branch Chief – Protection Branch

Drinking Water Protection Division

Office of Ground Water & Drinking Water

202-564-4618

**From:** Corr, Elizabeth  
**Sent:** Thursday, May 14, 2015 8:06 PM



**To:** Briskin, Jeanne  
**Cc:** Green, Holly; Kumar, Chitra; Bergman, Ronald; Lopez-Carbo, Maria  
**Subject:** h-frac doc for quick review from ORD \_ DO NOT FORWARD THIS

Jeanne – just picked up your v-mail and email. I’m sending the document to Holly and Chitra since they’re branch is where this is at – HF, current / future sources, etc. One of them will review your language and get back to you on whether we have issues with it.

# Ex. 5

**Holly, Chitra, Maria** – PLEASE DO NOT FORWARD THIS TO ANYONE – IT IS “CLOSE HOLD.” Where you need staff assistance, please just ask the narrow question, without providing the document. Please cc Ron and me on responses.

**Jeanne** -- What’s your deadline?

**From:** Briskin, Jeanne  
**Sent:** Thursday, May 14, 2015 3:40 PM  
**To:** Corr, Elizabeth  
**Subject:**

Hi Elizabeth,

Here is the draft, close hold document I left you a voice message about. Would it be possible for you all to quickly review it and let me know if there is anything here that

causes heartburn and if there are different/better citations we should be using, particularly

**Ex. 5**

There is about 6 pages of text total, the rest are maps, bibliography, etc.

Please let me know if you or someone could take a quick look over the next day or so.

Thanks very much,

Jeanne

<Pages from Pages from HFDWA Main Text 5-13-15 MALC.pdf>

**To:** Hauchman, Fred[hauchman.fred@epa.gov]  
**Cc:** Wiser, Nathan[Wiser.Nathan@epa.gov]; Burden, Susan[Burden.Susan@epa.gov]  
**From:** Briskin, Jeanne  
**Sent:** Thur 5/14/2015 7:41:32 PM  
**Subject:** RE: Q and A

Fred, Tom is leading the briefing for R3 starting at 10 am tomorrow.

**Ex. 5**

**Ex. 5**

Jeanne

**From:** Wiser, Nathan  
**Sent:** Thursday, May 14, 2015 3:25 PM  
**To:** Hauchman, Fred; Burden, Susan  
**Cc:** Briskin, Jeanne  
**Subject:** RE: Q and A

Hi Fred,

Attached is the draft briefing material for a possible DOE briefing produced from among myself, Jeanne and Susan B.

Nathan Wiser, Environmental Scientist

Office of Research and Development, Office of Science Policy

303-312-6211 office

[wiser.nathan@epa.gov](mailto:wiser.nathan@epa.gov)

mailing address:

EPA Region 8 (8ENF-UFO)

1595 Wynkoop Street

Denver, CO 80202

**From:** Hauchman, Fred  
**Sent:** Thursday, May 14, 2015 10:14 AM  
**To:** Burden, Susan; Wiser, Nathan  
**Subject:** RE: Q and A

Messages received. I'll be on the lookout for info from both of you. Thx.

**From:** Burden, Susan  
**Sent:** Thursday, May 14, 2015 11:36 AM  
**To:** Wiser, Nathan; Hauchman, Fred  
**Subject:** RE: Q and A

Hi Fred,

**Ex. 5**

Thanks,

Susan

Susan Burden, Ph.D.  
Office of Research and Development  
U.S. Environmental Protection Agency  
Email: [burden.susan@epa.gov](mailto:burden.susan@epa.gov)  
Phone: (202) 564-6308

---

**From:** [Wiser, Nathan](#)

**Sent:** 5/14/2015 11:17 AM

**To:** Hauchman, Fred

**Cc:** Burden, Susan

**Subject:** FW: Q and A

Hi Fred,

I will draft Q&A language around this issue, drawing from the WFR 1 report, and forward that language to you.

**Ex. 5**

**Ex. 5**

Look for something from me later today. If you wish, please feel free to contact me.

Nathan Wiser, Environmental Scientist

Office of Research and Development, Office of Science Policy

303-312-6211 office

[wiser.nathan@epa.gov](mailto:wiser.nathan@epa.gov)

mailing address:

EPA Region 8 (8ENF-UFO)

1595 Wynkoop Street

Denver, CO 80202

**From:** Frithsen, Jeff

**Sent:** Thursday, May 14, 2015 8:20 AM

**To:** Wiser, Nathan

**Cc:** Burden, Susan

**Subject:** HF: Q and A

Nathan:

May I impose on you to help out with drafting a few Q and As to address the topic in the email thread below? I'm imposing on you because Susan is reviewing the draft assessment.

**Ex. 5**

Jeff

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**From:** Burke, Thomas

**Sent:** Thursday, May 14, 2015 10:00 AM

**To:** Frithsen, Jeff

**Cc:** Hauchman, Fred; Briskin, Jeanne; Teichman, Kevin; Smith, Kelley; Gibbons, Dayna

**Subject:** Re: Forthcoming EPA Drinking Water Study, May 21st

Still need a brief q and a type answer describing how the number was derived and what exactly it means.

Sent from my iPhone

On May 14, 2015, at 9:57 AM, Frithsen, Jeff <[Frithsen.Jeff@epa.gov](mailto:Frithsen.Jeff@epa.gov)> wrote:

I briefly talked with Kevin this morning. He is checking back with Guido and what is needed and when.

**Ex. 5**

**Ex. 5**

Jeff

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**From:** Burke, Thomas  
**Sent:** Thursday, May 14, 2015 9:44 AM  
**To:** Hauchman, Fred  
**Cc:** Frithsen, Jeff; Briskin, Jeanne; Teichman, Kevin; Smith, Kelley  
**Subject:** Re: Forthcoming EPA Drinking Water Study, May 21st

Let's discuss.

**Ex. 5**

**Ex. 5**

Sent from my iPhone

On May 14, 2015, at 8:02 AM, Hauchman, Fred <[hauchman.fred@epa.gov](mailto:hauchman.fred@epa.gov)> wrote:

**Ex. 5**

Fred

Begin forwarded message:

**From:** "Teichman, Kevin" <[Teichman.Kevin@epa.gov](mailto:Teichman.Kevin@epa.gov)>  
**Date:** May 14, 2015 at 4:44:34 AM EDT  
**To:** "Burke, Thomas" <[Burke.Thomas@epa.gov](mailto:Burke.Thomas@epa.gov)>, "Smith, Kelley" <[Smith.Kelley@epa.gov](mailto:Smith.Kelley@epa.gov)>, "Frithsen, Jeff" <[Frithsen.Jeff@epa.gov](mailto:Frithsen.Jeff@epa.gov)>, "Marks, Teresa" <[Marks.Teresa@epa.gov](mailto:Marks.Teresa@epa.gov)>, "Briskin, Jeanne" <[Briskin.Jeanne@epa.gov](mailto:Briskin.Jeanne@epa.gov)>  
**Cc:** "Williams, Larke" <[Williams.Larke@epa.gov](mailto:Williams.Larke@epa.gov)>, "Martinez, Barbara" <[Martinez.Barbara@epa.gov](mailto:Martinez.Barbara@epa.gov)>, Guido DeHoratiis <[Guido.DeHoratiis@hq.doe.gov](mailto:Guido.DeHoratiis@hq.doe.gov)>, "Gentry, Nathan" <[Gentry.Nathan@epa.gov](mailto:Gentry.Nathan@epa.gov)>, "Hanley, Mary" <[Hanley.Mary@epa.gov](mailto:Hanley.Mary@epa.gov)>, "Maddox, Donald" <[Maddox.Donald@epa.gov](mailto:Maddox.Donald@epa.gov)>  
**Subject:** Re: Forthcoming EPA Drinking Water Study, May 21st

Passing along the request from DOE.

Sent from my iPhone



On May 13, 2015, at 5:13 PM, DeHoratiis, Guido  
<[Guido.DeHoratiis@hq.doe.gov](mailto:Guido.DeHoratiis@hq.doe.gov)> wrote:

Paula would like to have a call on Friday to discuss the Assessment of the  
Potential Impacts of Hydraulic Fracturing on Drinking Water Resources so  
that she can prepare to brief our Secretary.

**Ex. 5**

**Ex. 5**

**Ex. 5**

**Cc:** Dean, Jill[Dean.Jill@epa.gov]; Hillenbrand, Charles[Hillenbrand.Charles@epa.gov]  
**To:** Burden, Susan[Burden.Susan@epa.gov]; Wisner, Nathan[Wisner.Nathan@epa.gov]; Tinsley, Chuck[Tinsley.Chuck@epa.gov]; Daiss, Rebecca[Daiss.Rebecca@epa.gov]; Sharkey, Susan[Sharkey.Susan@epa.gov]; Fleming, Megan[Fleming.Megan@epa.gov]; Williams, Larke[Williams.Larke@epa.gov]; Singer, Alison[Singer.Alison@epa.gov]; Cluff, Maryam[Cluff.Maryam@epa.gov]  
**From:** Briskin, Jeanne  
**Sent:** Thur 5/7/2015 12:27:58 PM  
**Subject:** Fwd: Schedule for release of HF Study Reports and Draft Assessment

FYI

Begin forwarded message:

**From:** "Frithsen, Jeff" <Frithsen.Jeff@epa.gov>  
**Date:** May 7, 2015 at 7:45:31 AM EDT  
**To:** "Briskin, Jeanne" <Briskin.Jeanne@epa.gov>, "Teichman, Kevin" <Teichman.Kevin@epa.gov>, "Gibbons, Dayna" <Gibbons.Dayna@epa.gov>, "Zambrana, Jose" <Zambrana.Jose@epa.gov>, "Matthews, Lisa" <Matthews.Lisa@epa.gov>  
**Subject:** Schedule for release of HF Study Reports and Draft Assessment

FYI: I sent the following to Jennifer, Cindy, and Fred this morning.

May promises to be a very busy month for ORD and for the Agency. There are lots of activities coming to completion not only in our world of hydraulic fracturing, but in other parts of the Agency as well. Scheduling all those activities has become a bit of a challenge.

**Ex. 5**

**Ex. 5**

Thanks all! Almost there. Really!!

Jeff

**To:** Briskin, Jeanne[Briskin.Jeanne@epa.gov]  
**Cc:** Seltzer, Mark[Seltzer.Mark@epa.gov]; Sharkey, Susan[Sharkey.Susan@epa.gov]  
**From:** Dutta, Subijoy  
**Sent:** Tue 7/14/2015 10:24:13 PM  
**Subject:** RE: BLM's request for coordination with the EPA study for the HF - Rule - preliminary progress report on the HF-Study

Thanks, Jeanne for your prompt and timely response.  
It was good to talk with you as well.  
Hope to meet with you all sometime.

Subijoy

sent from my mobile device  
Subijoy Dutta, P.E.  
WO310  
20 M. Street SE, DC 20003  
P: 202-912-7152;

**Ex. 6**

On Jul 14, 2015 1:48 PM, "Briskin, Jeanne" <Briskin.Jeanne@epa.gov> wrote:

Please see the draft assessment for this information, particularly chapter 6. For example:

Chapter 5.5.6 ND blowout

Chapter 6.2.2.1 casing failure ND,

6.2.2.1 Marcellus – poor well construction – casing and cement failure; failed well packer

6.2.2.2 Ohio – cement failure

6.2.2.3 Sustained casing pressure , cement issue, faults and fractures, – Colorado

6.3.2 HF directly into drinking water resources, WY, see table 6-2; also EPA well file review – locations not available (statistical survey does not have results by location), and p. 6-34 9 alabama, Colorado, ND, UT, WY

6.3.2.3 – well communication – Canada

I will be off the phone soon and will try to call you

**From:** Dutta, Subijoy [mailto:[sdutta@blm.gov](mailto:sdutta@blm.gov)]  
**Sent:** Tuesday, July 14, 2015 1:29 PM  
**To:** Seltzer, Mark; Sharkey, Susan; Briskin, Jeanne  
**Subject:** Fwd: BLM's request for coordination with the EPA study for the HF - Rule - preliminary progress report on the HF-Study

Jeanne/Susan:  
Just for your reference... Below

## Ex. 5 - Deliberative

Thanks.

Subijoy

PS: I will try to call Jeanne soon. Now in a shuttle to the Main building at 18th and C.

sent from my mobile device

Subijoy Dutta, P.E.

WO310

20 M. Street SE, DC 20003

P: 202-912-7152

Ex. 6

----- Forwarded message -----

From: "Dutta, Subijoy" <[sdutta@blm.gov](mailto:sdutta@blm.gov)>

Date: Jul 14, 2015 11:15 AM

Subject: Fwd: BLM's request for coordination with the EPA study for the HF - Rule - preliminary progress report on the HF-Study

To: "Subijoy Dutta" <[sdutta@blm.gov](mailto:sdutta@blm.gov)>

Cc:

FYI

Subjoy Dutta, P.E.

Lead Petroleum Engineer

Fluid Minerals Division

20 M. Street SE, Washington, DC 20003

Ph: 202-912-7152; **Ex. 6**

[www.blm.gov](http://www.blm.gov); email: [sdutta@blm.gov](mailto:sdutta@blm.gov)

# Non-Responsive

# Non-Responsive

# Non-Responsive



# Non-Responsive

**To:** LeDuc, Stephen[LeDuc.Stephen@epa.gov]; Frithsen, Jeff[Frithsen.Jeff@epa.gov]; Knightes, Chris[Knightes.Chris@epa.gov]  
**Cc:** Ridley, Caroline[Ridley.Caroline@epa.gov]; Burden, Susan[Burden.Susan@epa.gov]  
**From:** Shari Ring  
**Sent:** Tue 5/19/2015 5:33:43 PM  
**Subject:** RE: Comments on executive summary

Hi Steve,

Does the para still look like the one below (sorry, I am losing track)? The topic sentence doesn't go w/ the rest of it – it should start with something like this:

**Ex. 5**

Shari Ring

The Cadmus Group, Inc.

703.247.6159

**From:** LeDuc, Stephen [mailto:LeDuc.Stephen@epa.gov]

**Sent:** Tuesday, May 19, 2015 1:09 PM  
**To:** Shari Ring; Frithsen, Jeff; Knightes, Chris  
**Cc:** Ridley, Caroline; Burden, Susan  
**Subject:** RE: Comments on executive summary

OK, thank you Shari. We will consider how to use/note in the ES. It definitely seems appropriate in your chapter. Best, Steve

**From:** Shari Ring; **Ex. 4**  
**Sent:** Monday, May 18, 2015 3:01 PM  
**To:** Frithsen, Jeff; LeDuc, Stephen; Knightes, Chris  
**Cc:** Ridley, Caroline; Burden, Susan  
**Subject:** RE: Comments on executive summary

**Ex. 5**

Shari Ring

The Cadmus Group, Inc.

703.247.6159

**From:** Frithsen, Jeff [<mailto:Frithsen.Jeff@epa.gov>]  
**Sent:** Monday, May 18, 2015 2:59 PM  
**To:** LeDuc, Stephen; Shari Ring; Knightes, Chris  
**Cc:** Ridley, Caroline; Burden, Susan  
**Subject:** RE: Comments on executive summary

**Ex. 5**

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**From:** LeDuc, Stephen  
**Sent:** Monday, May 18, 2015 2:51 PM  
**To:** [Shari Ring](#) **Ex. 4** Knightes, Chris  
**Cc:** Ridley, Caroline; Frithsen, Jeff; Burden, Susan  
**Subject:** FW: Comments on executive summary

Hi Shari and Chris,

**Ex. 5**

**From:** Frithsen, Jeff  
**Sent:** Monday, May 18, 2015 12:57 PM  
**To:** Burden, Susan; Frithsen, Jeff; LeDuc, Stephen; Ridley, Caroline  
**Subject:** FW: Comments on executive summary

Additional comments on executive summary....

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**From:** Briskin, Jeanne  
**Sent:** Monday, May 18, 2015 12:12 PM  
**To:** Frithsen, Jeff  
**Cc:** Hauchman, Fred; Burden, Susan  
**Subject:** Comments on executive summary

Please let me know which if any of the edits I've recommended you can incorporate, so I can follow up with Fred, elevate quickly if necessary.

This is a short summary. You'll find some additional context in the annotated attachment

**Ex. 5**

# Ex. 5

These points probably need to be fixed in the assessment too. There are a couple of additional points in track changes and comment boxes of the attachment.

**To:** Burden, Susan[Burden.Susan@epa.gov]; Fleming, Megan[Fleming.Megan@epa.gov]  
**From:** LeDuc, Stephen  
**Sent:** Tue 5/19/2015 3:29:39 PM  
**Subject:** RE: Environmental Science & Technology Vol. 49, No. 10, May 19, 2015 is now available online

Thanks Susan. However, we did determine that this was the wrong Scanlon et al. 2014 cited in the ES and the Water Chapter. Best, Steve

**From:** Burden, Susan  
**Sent:** Tuesday, May 19, 2015 11:25 AM  
**To:** Fleming, Megan; LeDuc, Stephen  
**Subject:** FW: Environmental Science & Technology Vol. 49, No. 10, May 19, 2015 is now available online

Hey,

See the TOC below. There's a comment and response to a Scanlon et al., 2014 paper that is cited in the assessment report.

Thanks,

Susan

Susan Burden, Ph.D.

Office of Research and Development

US Environmental Protection Agency

Phone: (202) 564-6308

Email: [burden.susan@epa.gov](mailto:burden.susan@epa.gov)

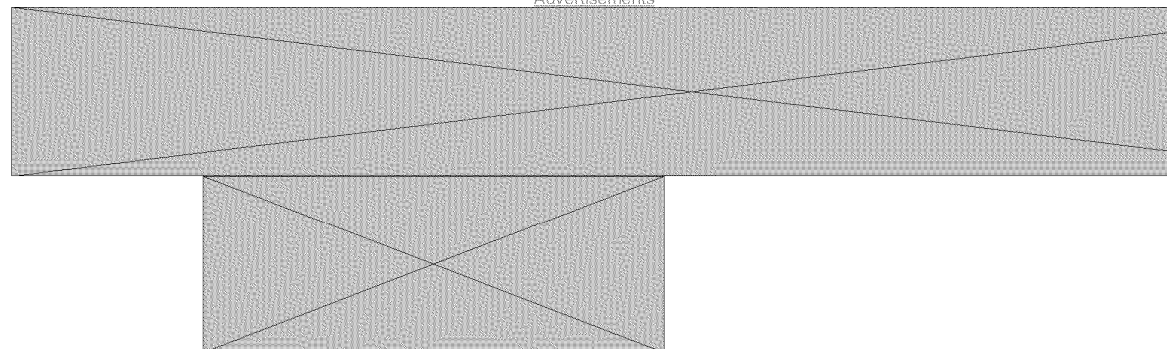
**From:** ACS e-Alerts Service [<mailto:journalalerts@acs.org>]

**Sent:** Tuesday, May 19, 2015 10:31 AM

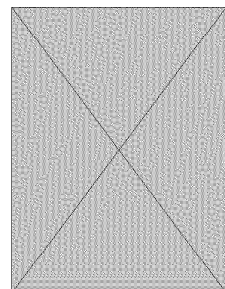
**To:** Burden, Susan

**Subject:** Environmental Science & Technology Vol. 49, No. 10, May 19, 2015 is now available online

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**Field Assessment of the Village Green Project: An Autonomous Community Air Quality Monitoring System**

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Keegan Rankin and Scott A. Mabury

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Santanu Patra, Ekta Roy, Rashmi Madhuri, and Prashant K. Sharma

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**Publication Date (Web):** Apr 22, 2015  
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**DOI:** [10.1021/acs.est.5b00832](https://doi.org/10.1021/acs.est.5b00832)

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**Direct and Complete Phosphorus Recovery from Municipal Wastewater Using a Hybrid Microfiltration-Forward Osmosis Membrane Bioreactor Process with Seawater Brine as Draw Solution**

Guanglei Qiu, Yi-Ming Law, Subhabrata Das, and Yen-Peng Ting

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**DOI:** [10.1021/es504554f](https://doi.org/10.1021/es504554f)

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**Quantitatively Predicting Bacterial Adhesion Using Surface Free Energy Determined with a Spectrophotometric Method**

Xinru Zhang, Qian Zhang, Tao Yan, Zeyi Jiang, Xinxin Zhang, and Yi Y. Zuo

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**Microbial Mats as a Biological Treatment Approach for Saline Wastewaters: The Case of Produced Water from Hydraulic Fracturing**

Benay Akyon, Elyse Stachler, Na Wei, and Kyle Bibby

**Publication Date (Web):** Apr 13, 2015  
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**DOI:** [10.1021/es505142t](https://doi.org/10.1021/es505142t)

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**Adsorption of Nitroaromatic Compounds on Graphene Oxide, Reduced Graphene Oxide, and Graphene Nanosheets**

Xiaoxiao Chen and Baoliang Chen

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**DOI:** [10.1021/es5054946](https://doi.org/10.1021/es5054946)

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**Improving the Visible Light Photoactivity of Supported Fullerene Photocatalysts through the Use of [C<sub>70</sub>] Fullerene**

Kyle J. Moor, Dhyana C. Valle, Chuanhao Li, and Jae-Hong Kim

**Publication Date (Web):** May 7, 2015  
pp. 6190–6197

**DOI:** [10.1021/es505888d](https://doi.org/10.1021/es505888d)

[ActiveView PDF](#) | [PDF](#) | [PDF w/ Links](#) | [Full Text HTML](#) | [Abstract](#)

**Transformation of Chloroform in Model Treatment Wetlands: From Mass Balance to Microbial Analysis**

Yi Chen, Yue Wen, Junwei Zhou, Qi Zhou, Jan Vymazal, and Peter Kuschik

**Publication Date (Web):** Apr 22, 2015  
pp. 6198–6205

**DOI:** [10.1021/es506357e](https://doi.org/10.1021/es506357e)

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**Electrochemical and Spectroscopic Evidence on the One-Electron Reduction of U(VI) to U(V) on Magnetite**

Ke Yuan, Eugene S. Ilton, Mark R. Antonio, Zhongrui Li, Peter J. Cook, and Udo Becker

**Publication Date (Web):** Apr 20, 2015  
pp. 6206–6213

**DOI:** [10.1021/acs.est.5b00025](https://doi.org/10.1021/acs.est.5b00025)

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**Identification of 4-Hydroxycumyl Alcohol As the Major MnO<sub>2</sub>-Mediated Bisphenol A Transformation Product and Evaluation of Its Environmental Fate**

Jeongdae Im, Carson W. Prevatte, Shawn R. Campagna, and Frank E. Löffler

**Publication Date (Web):** Apr 28, 2015  
**pp.** 6214–6221

**DOI:** [10.1021/acs.est.5b00372](https://doi.org/10.1021/acs.est.5b00372)

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**Biochar and Activated Carbon for Enhanced Trace Organic Contaminant Retention in Stormwater Infiltration Systems**

Bridget A. Ulrich, Eugenia A. Im, David Werner, and Christopher P. Higgins

**Publication Date (Web):** Apr 24, 2015  
**pp.** 6222–6230

**DOI:** [10.1021/acs.est.5b00376](https://doi.org/10.1021/acs.est.5b00376)

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**Investigation of Intertidal Wetland Sediment as a Novel Inoculation Source for Anaerobic Saline Wastewater Treatment**

Xueqing Shi, Kok Kwang Ng, Xiao-Ran Li, and How Yong Ng

**Publication Date (Web):** Apr 17, 2015  
**pp.** 6231–6239

**DOI:** [10.1021/acs.est.5b00546](https://doi.org/10.1021/acs.est.5b00546)

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**Facet-Dependent Catalytic Activity of Nanosheet-Assembled Bismuth Oxyiodide Microspheres in Degradation of Bisphenol A**

Meilan Pan, Haijun Zhang, Guandao Gao, Lu Liu, and Wei Chen

**Publication Date (Web):** Apr 21, 2015  
**pp.** 6240–6248

**DOI:** [10.1021/acs.est.5b00626](https://doi.org/10.1021/acs.est.5b00626)

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**Simultaneous Removal of Harmful Algal Blooms and Microcystins Using Microorganism- and Chitosan-Modified Local Soil**

Hong Li and Gang Pan

**Publication Date (Web):** Apr 22, 2015  
**pp.** 6249–6256

**DOI:** [10.1021/acs.est.5b00840](https://doi.org/10.1021/acs.est.5b00840)

[ActiveView PDF](#) | [PDF](#) | [PDF w/ Links](#) | [Full Text HTML](#) | [Abstract](#)  
**Sustainability Engineering and Green Chemistry**  
**Enhancing Toxic Metal Removal from Acidified Sludge with**  
**Nitrite Addition**

Fangzhou Du, Stefano Freguia, Zhiguo Yuan, Jürg Keller, and Ilje Pikaar

**Publication Date (Web):** Apr 15, 2015  
**pp.** 6257–6263

**DOI:** [10.1021/es504507m](https://doi.org/10.1021/es504507m)

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**Red Phosphorus: An Earth-Abundant Elemental**  
**Photocatalyst for “Green” Bacterial Inactivation under**  
**Visible Light**

Dehua Xia, Zhurui Shen, Guocheng Huang, Wanjun Wang, Jimmy C. Yu,  
and Po Keung Wong

**Publication Date (Web):** Apr 20, 2015  
**pp.** 6264–6273

**DOI:** [10.1021/acs.est.5b00531](https://doi.org/10.1021/acs.est.5b00531)

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**Ecotoxicology and Human Environmental Health**  
**Developmental Exposure to Aroclor 1254 Alters Migratory**  
**Behavior in Juvenile European Starlings (*Sturnus vulgaris*)**

Leanne M. Flahr, Nicole L. Michel, Alexander R. D. Zahara, Paul D. Jones,  
and Christy A. Morrissey

**Publication Date (Web):** Apr 20, 2015  
**pp.** 6274–6283

**DOI:** [10.1021/acs.est.5b01185](https://doi.org/10.1021/acs.est.5b01185)

[ActiveView PDF](#) | [PDF](#) | [PDF w/ Links](#) | [Full Text HTML](#) | [Abstract](#)  
**Toxicity Assessment of 4-Methyl-1-cyclohexanemethanol**  
**and Its Metabolites in Response to a Recent Chemical Spill**  
**in West Virginia, USA**

Jiaqi Lan, Man Hu, Ce Gao, Akram Alshawabkeh, and April Z. Gu

**Publication Date (Web):** May 11, 2015  
pp. 6284–6293

**DOI:** [10.1021/acs.est.5b00371](https://doi.org/10.1021/acs.est.5b00371)

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**Mutagenic Effects of Perfluorooctanesulfonic Acid in *gpt* Delta Transgenic System Are Mediated by Hydrogen Peroxide**

Yichen Wang, Xuefeng Zhang, Meimei Wang, Yiyi Cao, Xinan Wang, Yun Liu, Juan Wang, Jing Wang, Lijun Wu, Tom K. Hei, Yang Luan, and An Xu

**Publication Date (Web):** Apr 15, 2015  
pp. 6294–6303

**DOI:** [10.1021/acs.est.5b00530](https://doi.org/10.1021/acs.est.5b00530)

[ActiveView PDF](#) | [PDF](#) | [PDF w/ Links](#) | [Full Text HTML](#) | [Abstract](#)  
**Experimental Dosing of Wetlands with Coagulants Removes Mercury from Surface Water and Decreases Mercury Bioaccumulation in Fish**

Joshua T. Ackerman, Tamara E. C. Kraus, Jacob A. Fleck, David P. Krabbenhoft, William R. Horwath, Sandra M. Bachand, Mark P. Herzog, C. Alex Hartman, and Philip A. M. Bachand

**Publication Date (Web):** Apr 20, 2015  
pp. 6304–6311

**DOI:** [10.1021/acs.est.5b00655](https://doi.org/10.1021/acs.est.5b00655)

[ActiveView PDF](#) | [PDF](#) | [PDF w/ Links](#) | [Full Text HTML](#) | [Abstract](#)  
**Independent Data Validation of an in Vitro Method for the Prediction of the Relative Bioavailability of Arsenic in Contaminated Soils**

Karen D. Bradham, Clay Nelson, Albert L. Juhasz, Euan Smith, Kirk Scheckel, Daniel R. Obenour, Bradley W. Miller, and David J. Thomas

**Publication Date (Web):** May 12, 2015  
pp. 6312–6318

**DOI:** [10.1021/acs.est.5b00905](https://doi.org/10.1021/acs.est.5b00905)

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**Evaluation of Estrogenic Activity of Wastewater:**

**Comparison Among In Vitro ER $\alpha$  Reporter Gene Assay, In Vivo Vitellogenin Induction, and Chemical Analysis**

Masaru Ihara, Tomokazu Kitamura, Vimal Kumar, Chang-Beom Park, Mariko O. Ihara, Sang-Jung Lee, Naoyuki Yamashita, Shinichi Miyagawa, Taisen Iguchi, Seiichiro Okamoto, Yutaka Suzuki, and Hiroaki Tanaka

**Publication Date (Web):** Apr 22, 2015  
**pp.** 6319–6326

**DOI:** [10.1021/acs.est.5b01027](https://doi.org/10.1021/acs.est.5b01027)

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**Energy and the Environment**  
**Optimal Intensity and Biomass Density for Biofuel Production in a Thin-Light-Path Photobioreactor**

Aadhar Jain, Nina Voulis, Erica E. Jung, Devin F. R. Doud, William B. Miller, Largus T. Angenent, and David Erickson

**Publication Date (Web):** Apr 24, 2015  
**pp.** 6327–6334

**DOI:** [10.1021/es5052777](https://doi.org/10.1021/es5052777)

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**Chemical Reactions of Portland Cement with Aqueous CO<sub>2</sub> and Their Impacts on Cement's Mechanical Properties under Geologic CO<sub>2</sub> Sequestration Conditions**

Qingyun Li, Yun Mook Lim, Katharine M. Flores, Kelly Kranjc, and Young-Shin Jun

**Publication Date (Web):** Apr 20, 2015  
**pp.** 6335–6343

**DOI:** [10.1021/es5063488](https://doi.org/10.1021/es5063488)

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**Current and Future Environmental Balance of Small-Scale Run-of-River Hydropower**

John Gallagher, David Styles, Aonghus McNabola, and A. Prysor Williams

**Publication Date (Web):** Apr 24, 2015  
**pp.** 6344–6351

**DOI:** [10.1021/acs.est.5b00716](https://doi.org/10.1021/acs.est.5b00716)

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## Correspondence

### **Comment on “*Sphagnum* Mosses from 21 Ombrotrophic Bogs in the Athabasca Bituminous Sands Region Show No Significant Atmospheric Contamination of ‘Heavy Metals’”**

Jules M. Blais and William F. Donahue

**Publication Date (Web):** May 5, 2015  
pp. 6352–6353

**DOI:** [10.1021/acs.est.5b00475](https://doi.org/10.1021/acs.est.5b00475)

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### **Response to Comment on “*Sphagnum* Mosses from 21 Ombrotrophic Bogs in the Athabasca Bituminous Sands Region Show No Significant Atmospheric Contamination of ‘Heavy Metals’”**

William Shotyk, Rene Belland, John Duke, Heike Kempter, Michael Krachler, Tommy Noernberg, Rick Pelletier, Melanie A. Vile, Kelman Wieder, Claudio Zacccone, and Shuangquan Zhang

**Publication Date (Web):** May 5, 2015  
pp. 6354–6357

**DOI:** [10.1021/acs.est.5b01229](https://doi.org/10.1021/acs.est.5b01229)

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### **Comment on “Comparison of Water Use for Hydraulic Fracturing for Unconventional Oil and Gas versus Conventional Oil”**

David J. Lampert

**Publication Date (Web):** May 4, 2015  
pp. 6358–6359

**DOI:** [10.1021/acs.est.5b00963](https://doi.org/10.1021/acs.est.5b00963)

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### **Response to Comment on “Comparison of Water Use for Hydraulic Fracturing for Unconventional Oil and Gas versus Conventional Oil”**

Bridget R. Scanlon, Robert C. Reedy, and J.-P. Nicot

**Publication Date (Web):** May 4, 2015  
pp. 6360–6361



DOI: [10.1021/acs.est.5b01497](https://doi.org/10.1021/acs.est.5b01497)

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## Additions and Corrections

### **Correction to Atom Exchange between Aqueous Fe(II) and Structural Fe in Clay Minerals**

Anke Neumann, Lingling Wu, Weiqiang Li, Brian L. Beard, Clark M. Johnson, Kevin M. Rosso, Andrew J. Friedrich, and Michelle M. Scherer

**Publication Date (Web):** May 5, 2015  
**pp.** 6362–6362

DOI: [10.1021/acs.est.5b01659](https://doi.org/10.1021/acs.est.5b01659)

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### **Correction to Effect of Silicate on the Formation and Stability of Ni–Al LDH at the $\gamma$ -Al<sub>2</sub>O<sub>3</sub> Surface**

Xiaoli Tan, Ming Fang, Xuemei Ren, Huiyang Mei, Dadong Shao, and Xiangke Wang

**Publication Date (Web):** May 5, 2015  
**pp.** 6363–6363

DOI: [10.1021/acs.est.5b02019](https://doi.org/10.1021/acs.est.5b02019)

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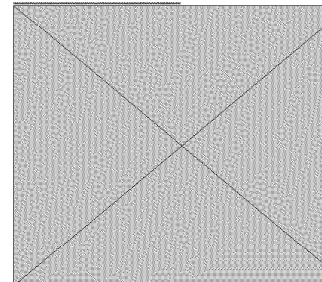
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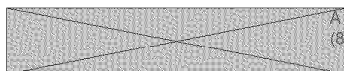
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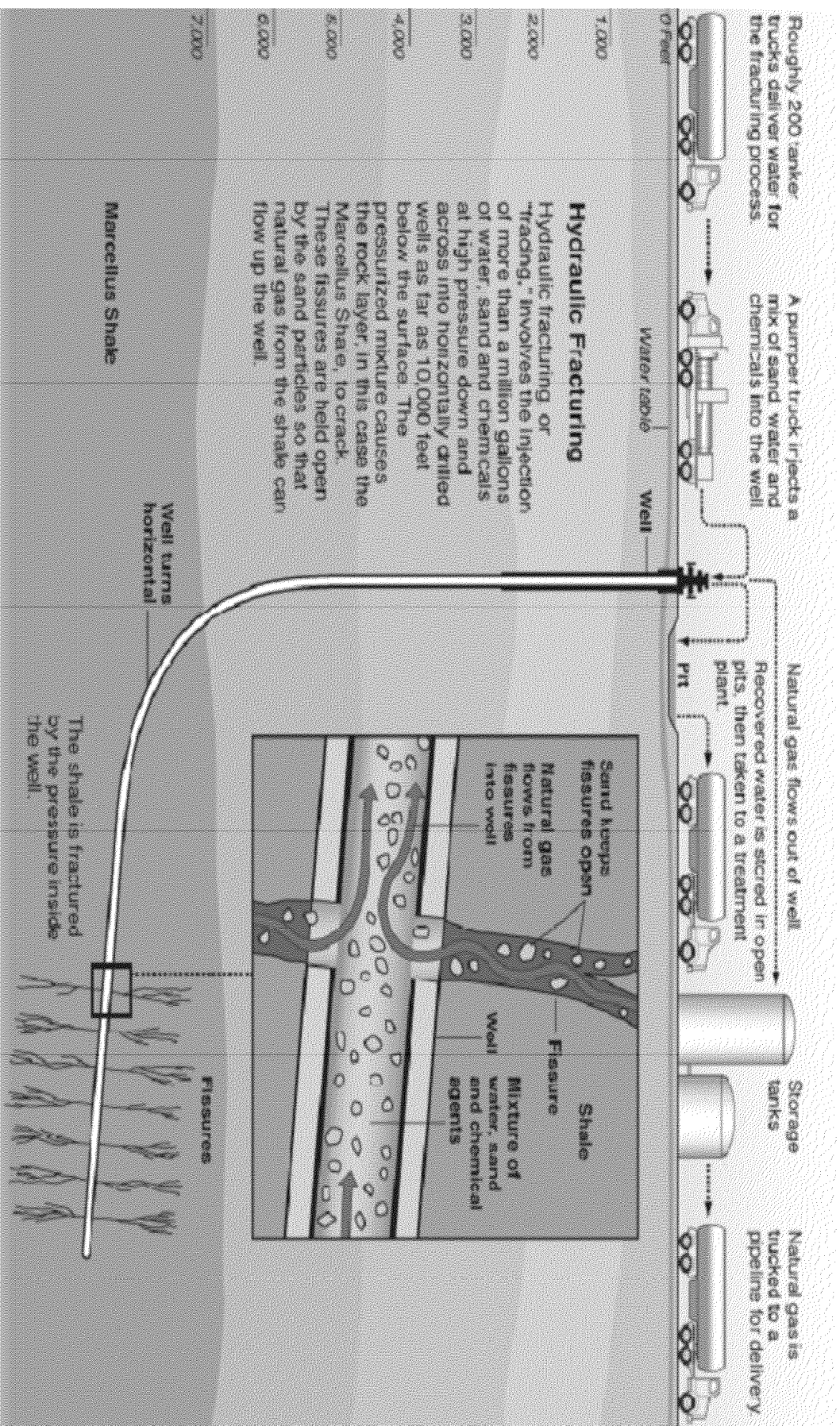
To: Ridley, Caroline[Ridley.Caroline@epa.gov]; Burden, Susan[Burden.Susan@epa.gov];  
Frithsen, Jeff[Frithsen.Jeff@epa.gov]; LeDuc, Stephen[LeDuc.Stephen@epa.gov];  
Ex. 6; Yohannes,  
Lia[Yohannes.Lia@epa.gov]; Fleming, Megan[Fleming.Megan@epa.gov]; Knightes,  
Chris[Knightes.Chris@epa.gov]; Ex. 6;  
Weaver, Jim[Weaver.Jim@epa.gov]; Cluff, Maryam[Cluff.Maryam@epa.gov];  
Ex. 6; Stanek,  
John[Stanek.John@epa.gov]; Solomon, Sarah[Solomon.Sarah@epa.gov]

## Non-Responsive

Continuation of our weekly call.

Agenda to be sent week of.

# What is Hydraulic Fracturing?



**To:** Burke, Thomas[Burke.Thomas@epa.gov]  
**From:** Hickey, Mike  
**Sent:** Wed 6/3/2015 11:57:28 PM  
**Subject:** RE: EPA External Review Draft of the Hydraulic Fracturing Drinking Water Assessment

Thanks Tom for sending the draft assessment report.

**Non-Responsive**

**Non-Responsive**

Mike Hickey

Chief, Environment Branch

OMB

202-395-3040

**From:** Smith, Kelley [mailto:Smith.Kelley@epa.gov] **On Behalf Of** Burke, Thomas  
**Sent:** Wednesday, June 03, 2015 6:12 PM  
**To:** Deese, Brian C.; Hornung, Daniel; Vahlsing, Candace; Hickey, Mike  
**Cc:** Fritz, Matthew; Reynolds, Thomas; Marks, Teresa  
**Subject:** EPA External Review Draft of the Hydraulic Fracturing Drinking Water Assessment

Good Afternoon,

I am pleased to share the Environmental Protection Agency's External Review Draft of the Hydraulic Fracturing Drinking Water Assessment for your reference. We also anticipate that the communications materials will be shared as soon as possible by my colleague Tom Reynolds. EPA is on track to release the draft assessment and nine other reports that the assessment references tomorrow between 12:00 – 1:00 PM for public comment and peer review by the EPA Science Advisory Board (SAB).

This draft assessment represents a significant advancement in our understanding of the potential impacts of hydraulic fracturing on drinking water resources and highlights potential vulnerabilities that hydraulic fracturing may pose to drinking water resources. This draft assessment will give state regulators, tribes and local communities and industry around the country a critical resource to help them identify how best to protect public health and drinking

water resources.

Thank you,

Tom

Dr. Thomas Burke

EPA Science Advisor

Environmental Protection Agency

[Burke.Thomas@epa.gov](mailto:Burke.Thomas@epa.gov)

# Ex. 6

Ex. 6

Michael\_Hickey@omb.eop.gov[Michael\_Hickey@omb.eop.gov]

**Cc:** Fritz, Matthew[Fritz.Matthew@epa.gov]; Reynolds, Thomas[Reynolds.Thomas@epa.gov]; Marks, Teresa[Marks.Teresa@epa.gov]

**From:** Smith, Kelley

**Sent:** Wed 6/3/2015 10:11:33 PM

**Subject:** EPA External Review Draft of the Hydraulic Fracturing Drinking Water Assessment  
EPA External Review Draft of the Hydraulic Fracturing Drinking Water Assessment 6.3.2015.pdf

Good Afternoon,

I am pleased to share the Environmental Protection Agency's External Review Draft of the Hydraulic Fracturing Drinking Water Assessment for your reference. We also anticipate that the communications materials will be shared as soon as possible by my colleague Tom Reynolds. EPA is on track to release the draft assessment and nine other reports that the assessment references tomorrow between 12:00 – 1:00 PM for public comment and peer review by the EPA Science Advisory Board (SAB).

This draft assessment represents a significant advancement in our understanding of the potential impacts of hydraulic fracturing on drinking water resources and highlights potential vulnerabilities that hydraulic fracturing may pose to drinking water resources. This draft assessment will give state regulators, tribes and local communities and industry around the country a critical resource to help them identify how best to protect public health and drinking water resources.

Thank you,

Tom

Dr. Thomas Burke

EPA Science Advisor

Environmental Protection Agency

Burke.Thomas@epa.gov



**To:** Fritz, Matthew[Fritz.Matthew@epa.gov]; Smith, Kelley[Smith.Kelley@epa.gov]  
**Cc:** Burke, Thomas[Burke.Thomas@epa.gov]; Purchia, Liz[Purchia.Liz@epa.gov]  
**From:** Frithsen, Jeff  
**Sent:** Wed 6/3/2015 8:51:56 PM  
**Subject:** RE: HF Drinking Water Study Transmittal to the WH

The PDF of volume 1 – the assessment itself – is done and I have sent to Kelley Smith.

Jeff

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**From:** Fritz, Matthew  
**Sent:** Wednesday, June 03, 2015 4:50 PM  
**To:** Smith, Kelley  
**Cc:** Burke, Thomas; Frithsen, Jeff; Purchia, Liz  
**Subject:** Re: HF Drinking Water Study Transmittal to the WH

No objections here - might be nice from Tom.

On Jun 3, 2015, at 4:40 PM, Smith, Kelley <[Smith.Kelley@epa.gov](mailto:Smith.Kelley@epa.gov)> wrote:

Good Afternoon Tom and Matt,

Jeff Frithsen indicated that the PDFs of the HF Drinking Water Study should be complete shortly. We also know that the communications materials likely won't be finalized until much later this evening. For awareness we also got another call from Mike Hickey (OMB) asking for a copy of the study.

# Ex. 5

Best,

KS

Kelley Smith

Program Advisor

Office of Research and Development

Environmental Protection Agency

202.564.2308 (Desk)

**Ex. 6**

[Smith.Kelley@epa.gov](mailto:Smith.Kelley@epa.gov)

**To:** Kadel, Lek[Kadel.Lek@epa.gov]; Kavlock, Robert[Kavlock.Robert@epa.gov]; Burke, Thomas[Burke.Thomas@epa.gov]  
**Cc:** Deener, Kathleen[Deener.Kathleen@epa.gov]; Battaglia, Amy[Battaglia.Amy@epa.gov]  
**From:** Smith, Kelley  
**Sent:** Mon 6/1/2015 11:52:51 PM  
**Subject:** Re: voice mail from mike hickey....

Good Evening,

Matt Fritz responded and is ok with us sharing the message below:

**Ex. 5**

Best,

KS

Sent from my iPhone

On Jun 1, 2015, at 6:22 PM, Smith, Kelley <[Smith.Kelley@epa.gov](mailto:Smith.Kelley@epa.gov)> wrote:

Lek, Bob, and Tom,

OMB inquired via Amy Battaglia's team and OCFO last week. We responded via email and said that the study was not yet ready, but that we would share it as soon as it is ready. Someone from OMB called Dan Gonzalez earlier today and Mike Hickey also called Kacee Deener sometime this afternoon.

**Ex. 5**

**Ex. 5**

# Ex. 5

Best,

KS

Kelley Smith

Program Advisor

Office of Research and Development

Environmental Protection Agency

202.564.2308 (Desk)

Ex. 6

[Smith.Kelley@epa.gov](mailto:Smith.Kelley@epa.gov)

**From:** Kadeli, Lek

**Sent:** Monday, June 01, 2015 6:02 PM

**To:** Kavlock, Robert

**Cc:** Burke, Thomas; Smith, Kelley

**Subject:** Re: voice mail from mike hickey....

I'll give him a call in the am

Acting Assistant Administrator

Office of Research and Development

Environmental Protection Agency

Washington D.C.

(202)564-6620

On Jun 1, 2015, at 5:51 PM, Kavlock, Robert <[Kavlock.Robert@epa.gov](mailto:Kavlock.Robert@epa.gov)> wrote:

Wants to follow up on HF assessment from May briefing and status of release and 9 reports.....i don't know the latest....

395-3040

**To:** Burke, Thomas[Burke.Thomas@epa.gov]  
**From:** Hedman, Susan  
**Sent:** Fri 5/15/2015 9:27:06 PM  
**Subject:** FW: Follow-up to state briefing on EPA's Draft Hydraulic Fracturing Drinking Water Assessment

Tom –

The briefing this morning was terrific. Thanks very much for taking the time to provide advance notice to Ohio.

Best,

Susan

Susan Hedman

Region 5 Administrator/Great Lakes National Program Manager

U.S. Environmental Protection Agency

77 West Jackson Blvd - 19th Floor

Chicago, Illinois 60604-3590

**From:** Matthews, Lisa  
**Sent:** Friday, May 15, 2015 3:26 PM  
**To:** jquigley@pa.gov; dbrinley@pa.gov; scperry@pa.gov; kheffner@pa.gov; mike.baker@epa.ohio.gov; Jeffrey.patzke@epa.ohio.gov; l.taliaferro@epa.ohio.gov; Richard.Trippel@dnr.state.oh.us  
**Cc:** craig.butler2@epa.ohio.gov; james.zehringer@dnr.state.oh.us; Scott.Kell@dnr.state.oh.us; Garvin, Shawn; Early, William; Capacasa, Jon; Hedman, Susan; Marks, Teresa; Burke, Thomas;

Frithsen, Jeff; Bueno, Michael

**Subject:** Follow-up to state briefing on EPA's Draft Hydraulic Fracturing Drinking Water Assessment

Thank you for participating in our state briefing on EPA's Draft Hydraulic Fracturing Drinking Water Assessment.

We appreciated your thoughtful comments on our work and on how we communicate the major messages of the draft assessment.

We know you will likely receive media inquiries about various aspects of the assessment and the states' role and activities. To help you prepare for these inquiries, we've compiled some common questions (attached) we think you may receive.

These questions do not include results or findings from the assessment. Rather, they are based on the research questions and chapters of the assessment and are meant to give an overview of key topics and help you prepare your own communication materials.

We hope you'll provide feedback on the draft assessment during the public comment and SAB review process. We look forward to our continued partnership on this and other environment and public health matters.

If you have any questions, please feel free to contact Teresa Marks ([marks.teresa@epa.gov](mailto:marks.teresa@epa.gov)) or me. Please remember that the information presented at this meeting and discussed is embargoed until the reports are publicly released.

Regards,

Lisa Matthews

Senior Advisor – State Engagement

US EPA Office of Research and Development

202-564-6669 office

**Ex. 6**

[matthews.lisa@epa.gov](mailto:matthews.lisa@epa.gov)



**To:** Frithsen, Jeff[Frithsen.Jeff@epa.gov]  
**From:** Smith, Kelley  
**Sent:** Mon 5/4/2015 1:37:48 PM  
**Subject:** Re: HF: Draft Briefing for the EOP

**Ex. 5**

Also Nathan will be setting up a pre brief before 12 with Tom

Sent from my iPhone

> On May 4, 2015, at 9:23 AM, Frithsen, Jeff <Frithsen.Jeff@epa.gov> wrote:  
>  
> Attached is a draft of the briefing for the EOP this afternoon.  
>  
> This reflects revisions to presentations made last week.  
>  
> Comments and suggestions welcome, but needed this morning so as to finalize at noon and make a few copies.  
>  
> Thanks all.  
>  
> Jeff  
>  
>  
> Jeffrey B. Frithsen, Ph.D.  
> National Center for Environmental Assessment  
> Office of Research and Development  
> U.S. Environmental Protection Agency  
> 1200 Pennsylvania Avenue, SW (8623-P)  
> Washington, DC 20460  
> 703-347-8623 (office phone)  
>  
> Physical Office Address/Overnight Deliveries  
> Two Potomac Yard (North Building), Room N-7741  
> 2733 South Crystal Drive, Arlington, VA 22202  
>  
> <HFDWA Briefing EOP 20150504 Draft.pptx>

**To:** Candace Vahlsing[Ex. 6]  
**Cc:** Fritz, Matthew[Fritz.Matthew@epa.gov]; Marks, Teresa[Marks.Teresa@epa.gov]  
**From:** Hanley, Mary  
**Sent:** Tue 5/12/2015 1:15:46 AM  
**Subject:** Fwd: Draft Retro messages  
[Overarching RetrospectiveCase Studiesdgv5perryJPV.docx](#)  
[ATT00001.htm](#)  
[Top Lines HF 5 11 15 \(4\).docx](#)  
[ATT00002.htm](#)

Candace,

Please find topline messages for the assessment as well as points for the retrospective studies attached. Per your request we will provide additional points on our progress on hydraulic fracturing on Wednesday.

Mary

Sent from my iPhone

Begin forwarded message:

202-564-7983

[gibbons.dayna@epa.gov](mailto:gibbons.dayna@epa.gov)

Communications

Office of Research and Development

U.S. Environmental Protection Agency

**To:** Matthews, Lisa[Matthews.Lisa@epa.gov]  
**Cc:** Gibbons, Dayna[Gibbons.Dayna@epa.gov]; Smith, Kelley[Smith.Kelley@epa.gov]  
**From:** Frithsen, Jeff  
**Sent:** Mon 5/4/2015 11:17:13 PM  
**Subject:** HF: Outreach with states

Lisa:

The briefing with EOP folks went very well today. One issue that will require follow-up is that we were asked to provide briefing/talking points to the EOP before we meet with state folks.

## Ex. 5

Concerning the meeting with the states, we have agreement on the videoconferencing plan with the states. However, there is still unease about teleconferencing. Is it possible to go to the operator assisted approach for the teleconferencing so that an operator records who is calling in and checks names with a master list that we are keeping? I think that sort of approach was used for the press conferences for the FracFocus report. What do you think? Possible?

Jeff

Jeffrey B. Frithsen, Ph.D.

National Center for Environmental Assessment

Office of Research and Development

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue, SW (8623-P)

Washington, DC 20460

703-347-8623 (office phone)

Physical Office Address/Overnight Deliveries

Two Potomac Yard (North Building), Room N-7741

2733 South Crystal Drive, Arlington, VA 22202



# **Study of the Potential Impacts of Hydraulic Fracturing for Oil & Gas on Drinking Water Resources**

Presentation for the National Tribal Water Council

Annual Meeting

April 22, 2015

# What is hydraulic fracturing?



- Hydraulic fracturing is a stimulation technique used to increase production of oil and gas that involves the injection of fluids under pressures great enough to fracture oil- and gas-production formations.
- Hydraulic fractures are created when a fluid is pumped down production wells at high pressure.
- Proppants are carried into the fractures so they remain open after the injection pumping pressure ends.



- Oil and gas can then flow through the fractures into the well and through the well to the

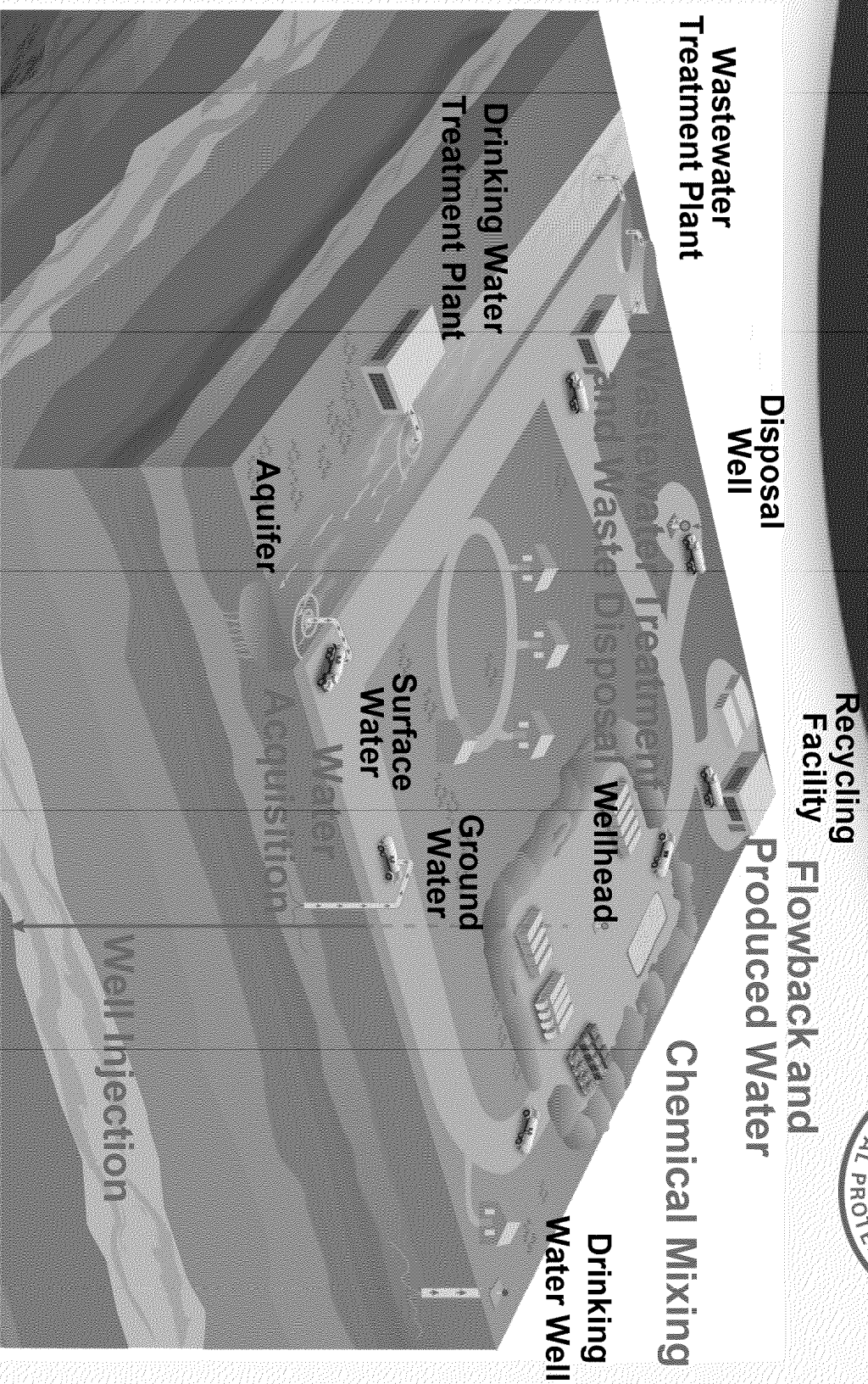


# Study Background



- In 2010, Congress urged EPA to study the relationship between hydraulic fracturing and drinking water.
- The study purpose is to:
  - Assess whether hydraulic fracturing can impact drinking water resources
  - Identify driving factors that affect the severity and frequency of any impacts
- EPA's HF study outlined in a 2011 report with additional details provided in a 2012 progress report.

# Hydraulic Fracturing Water Cycle

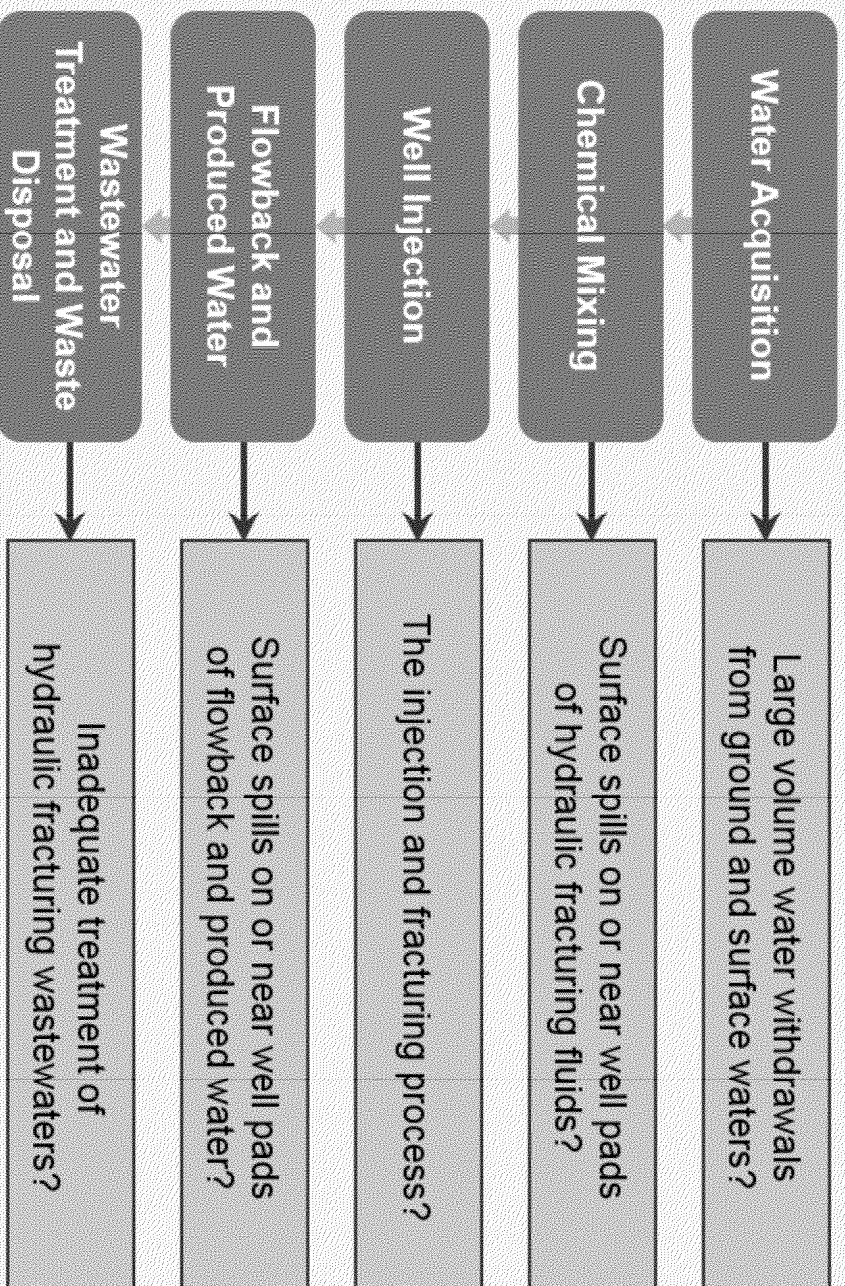




# Hydraulic Fracturing Water Cycle



What are the potential impacts on drinking water resources of:



# Hydraulic Fracturing Study Products



- Study is producing multiple EPA reports, journal publications, and an integrative assessment report.
- EPA has completed 3 technical reports and 4 journal publications.
- Another nine journal publications have been completed by colleagues at Lawrence Berkeley National Laboratory.
- EPA anticipates release of nine technical reports in spring 2015.
- EPA research studies being used to develop a state-of-the-science assessment report.



# Drinking Water Assessment Report



- EPA's Assessment Report will address primary research questions through synthesis of:
  - Results from study's research projects
  - Peer reviewed reports and scientific literature related to the study
  - Government reports and technical papers
  - Knowledge gained through technical stakeholder workshops and information submitted by stakeholders (e.g., EPA docket, comments submitted to Science Advisory Board)

# Assessment Report



## Potential Impacts evaluated:

- Impacts related to routine operations reflecting modern typical practices
- Potential and actual accidents or unintended events
- Potential immediate, short-term, and long-term impacts

## Intended Use:

- Contribute to understanding of potential impacts of hydraulic fracturing for oil and gas on drinking water resources
- Identify pathways of greatest concern
- Inform and promote dialogue among federal, tribal, state, and local government entities, industry, NGOs and other stakeholders
- Identify knowledge gaps and information needs

## Spatial Scope:

- National: Evaluating available information for multiple regions
- Evaluating potential impacts at multiple scales: Single well, cluster of wells, watershed, shale plays

# Assessment Report



## What it is:

- A state-of-the-science **integration and synthesis** of information
- Based upon EPA research results, a robust literature review, and other information
- Information addresses questions identified in the *Study Plan* and *Progress Report*

## What it is not:

- Not a human health or exposure assessment
- Not site specific
- Does not identify or evaluate best management practices
- Not designed to inform specific policy decisions
- Does not identify or evaluate policy options



# Additional Information



EPA's hydraulic fracturing drinking  
water study website:  
[www.epa.gov/hfstudy](http://www.epa.gov/hfstudy)

ORD technical contact:

- Jeffrey Frithsen, Ph.D.
- [Frithsen.jeff@epa.gov](mailto:Frithsen.jeff@epa.gov)

**To:** Perry, Dale[Perry.Dale@epa.gov]  
**From:** Gibbons, Dayna  
**Sent:** Wed 5/6/2015 8:43:04 PM  
**Subject:** overall study Qs\_May 2015.docx  
overall study Qs\_May 2015.docx

**To:**

**Ex. 6**

**From:** Maloney, Kelsey

**Sent:** Mon 6/22/2015 12:53:03 PM

**Subject:** RE: Form submission from: EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources Contact Us about EPA's Hydraulic Fracturing Study form

Thank you for your email and interest in EPA's Study of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources. The draft assessment addresses potential impacts to drinking water resources at each stage of the hydraulic fracturing water cycle: water acquisition, chemical mixing, well injection, flowback and produced water, and wastewater treatment and disposal. The draft assessment in its entirety may be downloaded at: <http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651>. The published scientific papers completed as part of the study can be found at: <http://www2.epa.gov/hfstudy/published-scientific-papers>.

-----Original Message-----

From: drupal\_admin@epa.gov [mailto:drupal\_admin@epa.gov]

Sent: Friday, June 19, 2015 5:02 PM

To: Maloney, Kelsey

Subject: Form submission from: EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources Contact Us about EPA's Hydraulic Fracturing Study form

Submitted on 06/19/2015 5:01PM

Submitted values are:

Name: Carlos Mora

Email:

**Ex. 6**

Comments: Hi, I'm professional and teaching Environmental Management, I live in Argentina. I would like to have information on recent EPA reports on impacts of fracking on water, air, soil and Society. many Thanks Web Area: EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources





# **Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources**

**Presentation by the  
U.S. Environmental Protection Agency  
Office of Research and Development**

**9 June 2015**

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  - Draft Hydraulic Fracturing Drinking Water Assessment report
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  - Raton Basin, CO
  - Wise County, TX
- Description of well construction and design characteristics.
- Characterization of spills related to HF operations.

# Draft HF Assessment Report



## What it is:

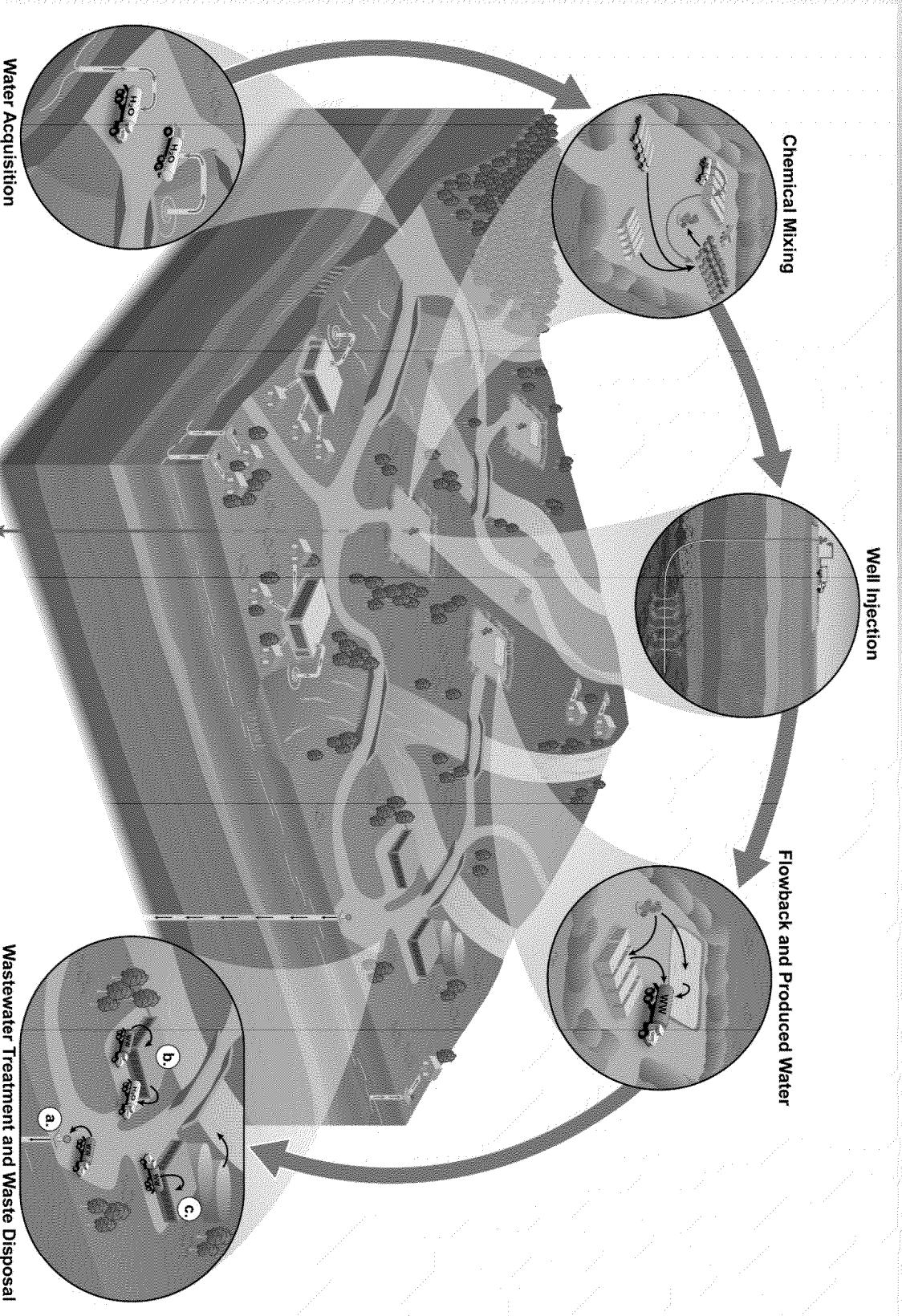
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# Hydraulic Fracturing Water Cycle: Follow the water



# Summary of Impacts on Drinking Water Resources



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- These vulnerabilities include:
  - Water withdrawals in areas with low water availability
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  - HF conducted directly into formations containing drinking water resources
  - Well integrity failures
  - Subsurface migration of gases and liquids
  - Inadequately treated wastewater
- Despite vulnerabilities, there is no evidence of widespread, systemic impacts on drinking water resources due to hydraulic fracturing activities.



# Water Acquisition: Sources and volume



- Sources of water used for HF include surface water, ground water, and reused wastewaters.
- Cumulative water use is at least 44 BG/year; Median water use for a well is approximately 1.5 MG.
- There is much variability and water use varies between <1 MG to >5 MG per well.
- Factors affecting water use include:
  - length of well (well volume)
  - formation depth and geology
  - fracturing fluid formulation

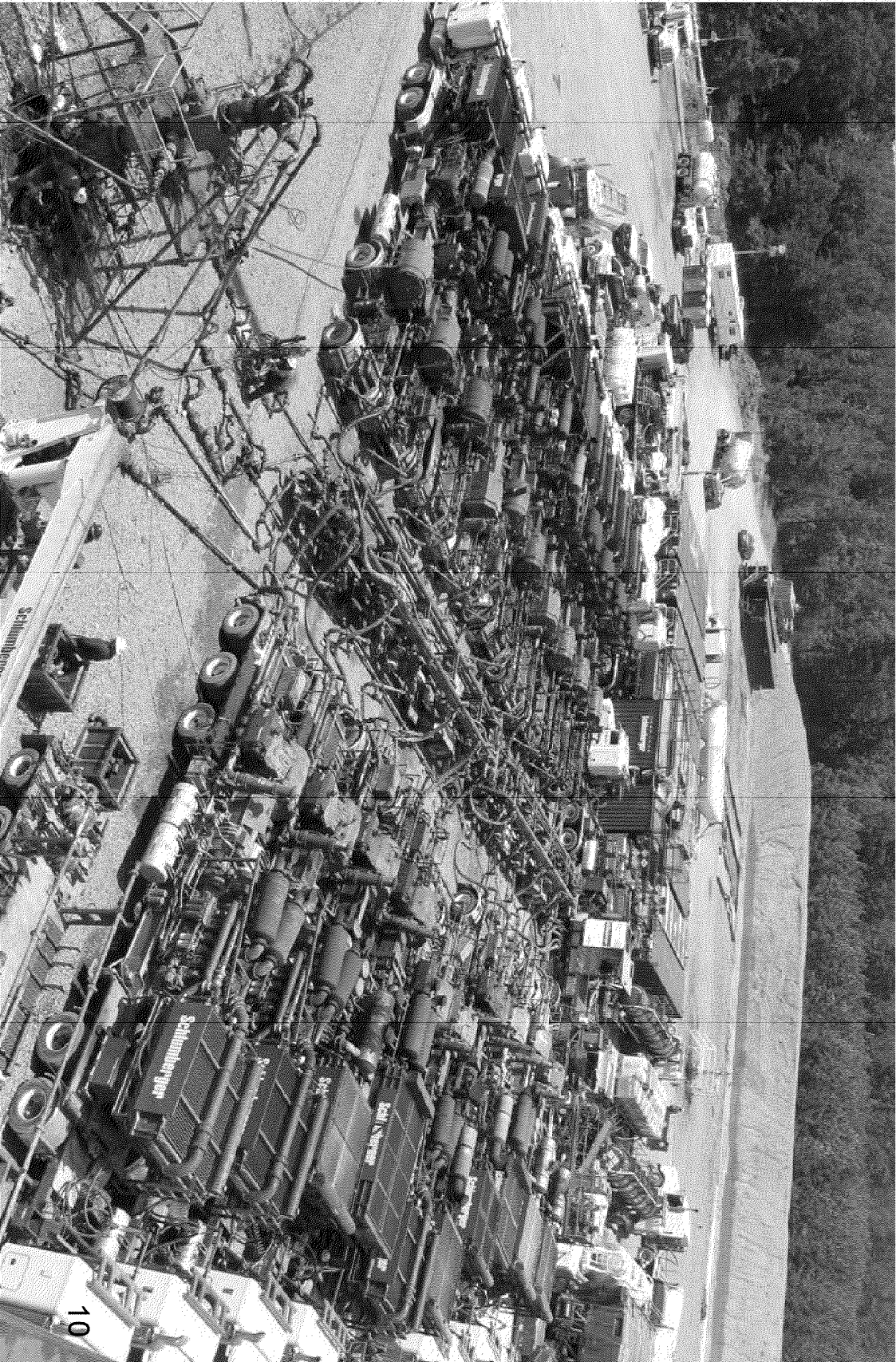


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- Potential for impacts on drinking water resources greatest in areas with:
  - High HF water use
  - Low water availability
  - Frequent drought
  - Declining water sources
- Example area experiencing all four factors: southern and western Texas.

# Chemical Mixing





# Chemical Mixing: HF Fluids



- **HF fluids generally consist of:**
  - Base fluid
  - Chemical additives
  - Proppants
- **Base fluids:**
  - Largest constituent by volume
  - Most often water
  - Other base fluids include: non-aqueous fluids, acids, energized fluids, foams and emulsions
- **Proppants:**
  - Most often sands, resin-coated sands, other specialty engineered particles



# Chemical Mixing: HF Chemical Additives

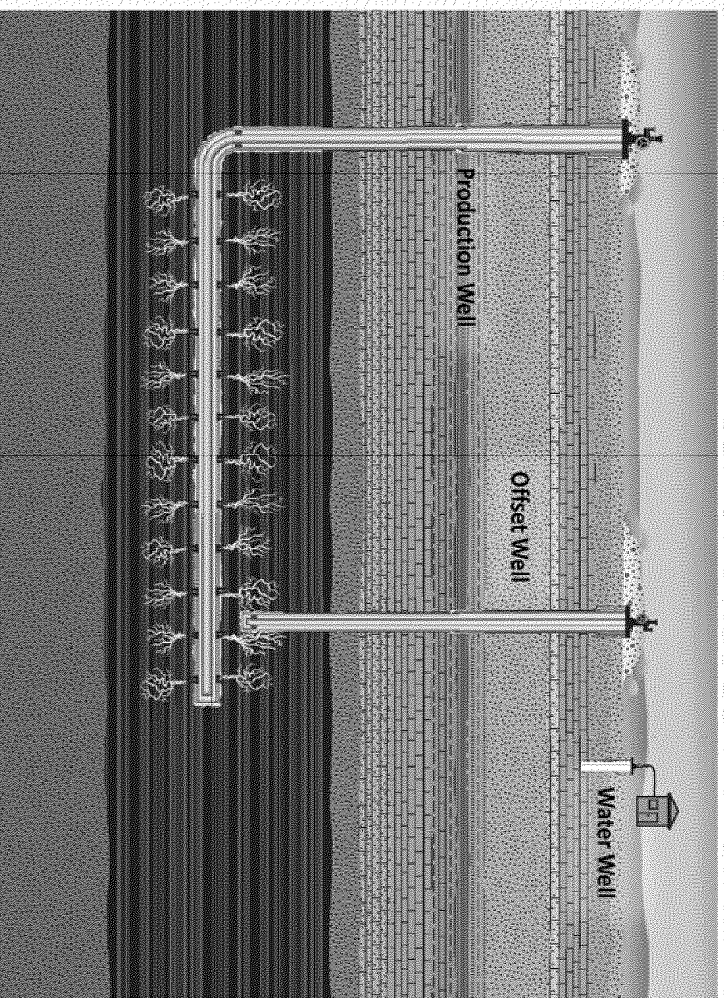


- Chemical additives:
  - Perform multiple functions
  - Can be a single chemical or a mixture of multiple chemicals
  - Are injected during different stages of the HF process
  - Generally comprise <2% of injected fluid volumes
  - Thousands of gallons are potentially stored on-site and used in the HF process
- We identified more than 1000 chemicals used as components of HF fluids:
  - Median of 14 unique chemicals used per well
  - No single chemical used at all well sites across country
  - Chemicals used at >65% of well sites include: methanol, hydrotreated light petroleum distillates, hydrochloric acid



# Well Injection: Potential subsurface pathways

- Movement of gas or liquids from the wellbore into a drinking water resource
- Movement of gas or liquids from production zone through subsurface rock formations into a drinking water resource



# Well Construction and Integrity



- Multiple barriers act together to prevent migration of gases and liquids.
- Inadequate construction, defects and degradation of casings or cement, or absence of redundancies can create pathways leading to contamination of drinking water resources.
- EPA's Well File Review Report:
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- Specific rate of well failures unknown but generally increases over time.



# Sub-Surface Movement



- Physical separation between the production zone and drinking water resources can minimize impacts.
- In some cases, the production zone is co-located with drinking water resources:
  - Estimated 0.4% of wells fractured in 2009 and 2010 showed evidence of fracturing directly within a drinking water resource
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- Amount of fracturing fluid returned to surface is generally 10% to 25% of injected fluid and varies widely.
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  - 134 chemical detected specifically in FB/PW
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  - Naturally occurring radionuclides
- High TDS present analytical challenges for characterizing chemical composition



# Chemical Mixing: Spills



**Volatilization**

Spilled Hydraulic Fracturing Fluid

chemicals penetrating soil layer above ground water

Unsaturated Soil

Ground Water

chemical ground water plume

**Dissolution**

**Sorption**

**Transformation**

**Schematic of the Fate and Transport Processes Governing Potential Impacts of Spills to Drinking Water Resources**

Surface Water

# Spills of HF Fluids and Produced Waters



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  - Spill volumes varied greatly: 2 gallons to 1.3 Million gallons
  - Most common causes of spills were equipment failure and human error
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**5 June 2015**



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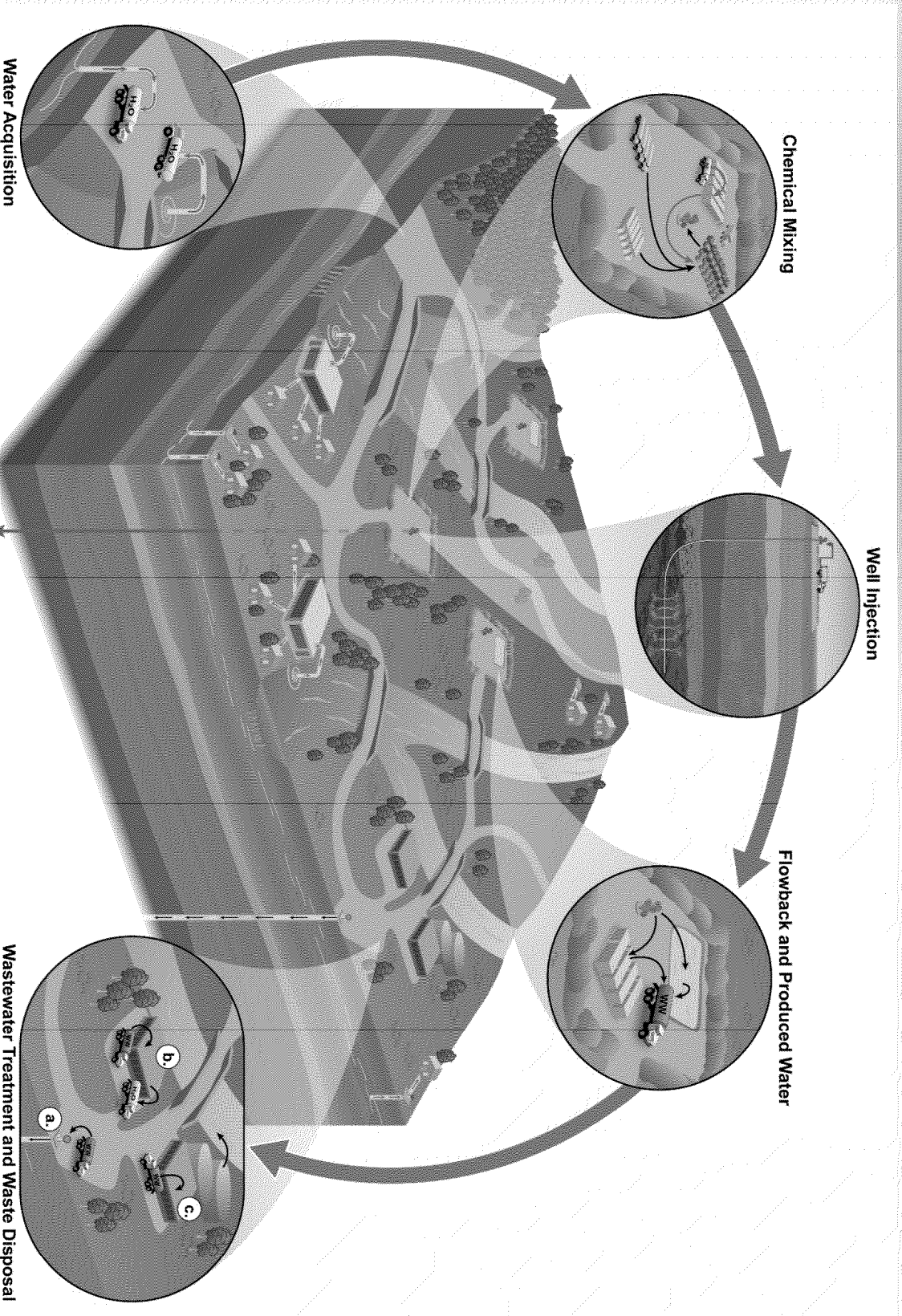
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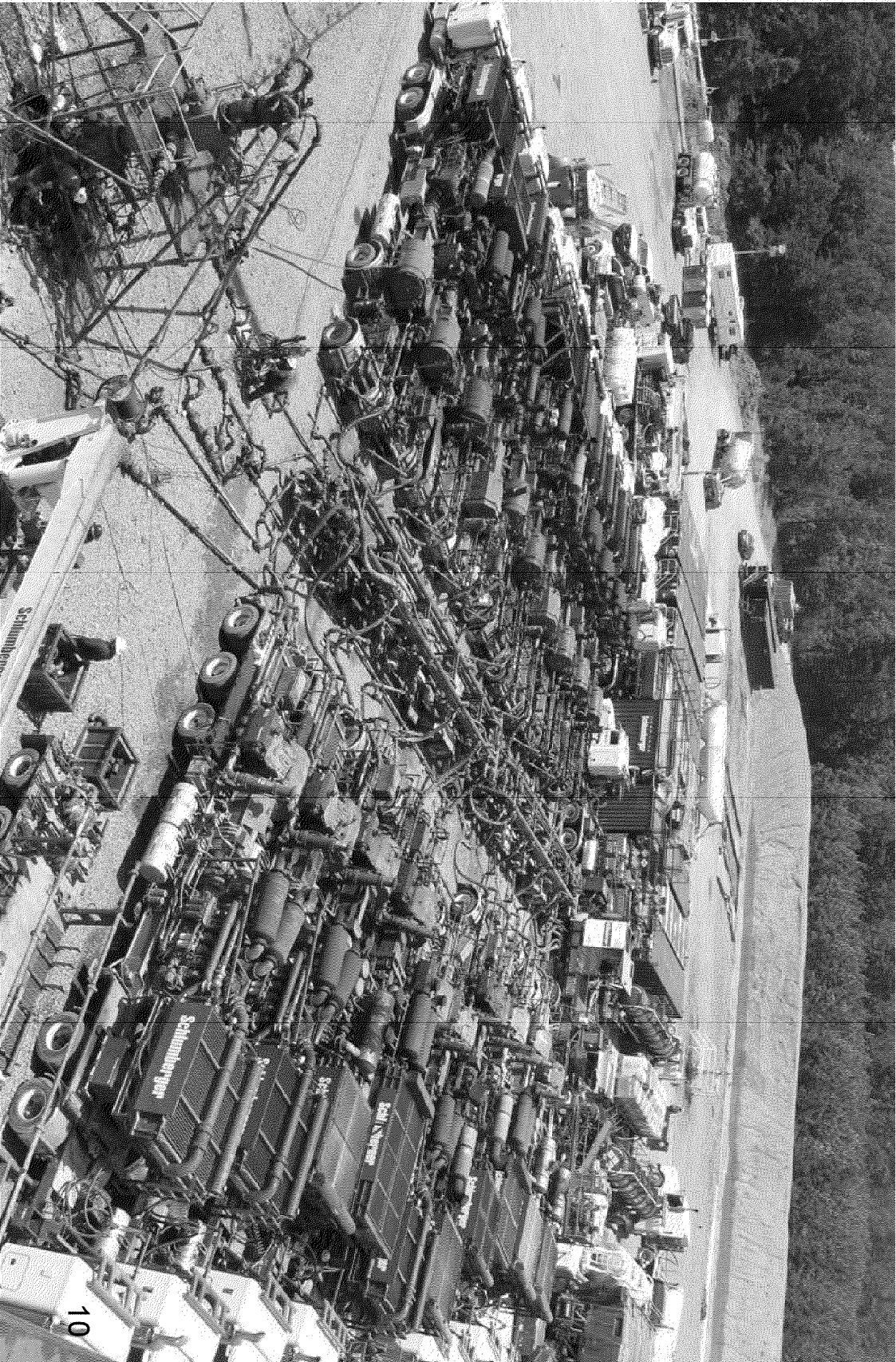
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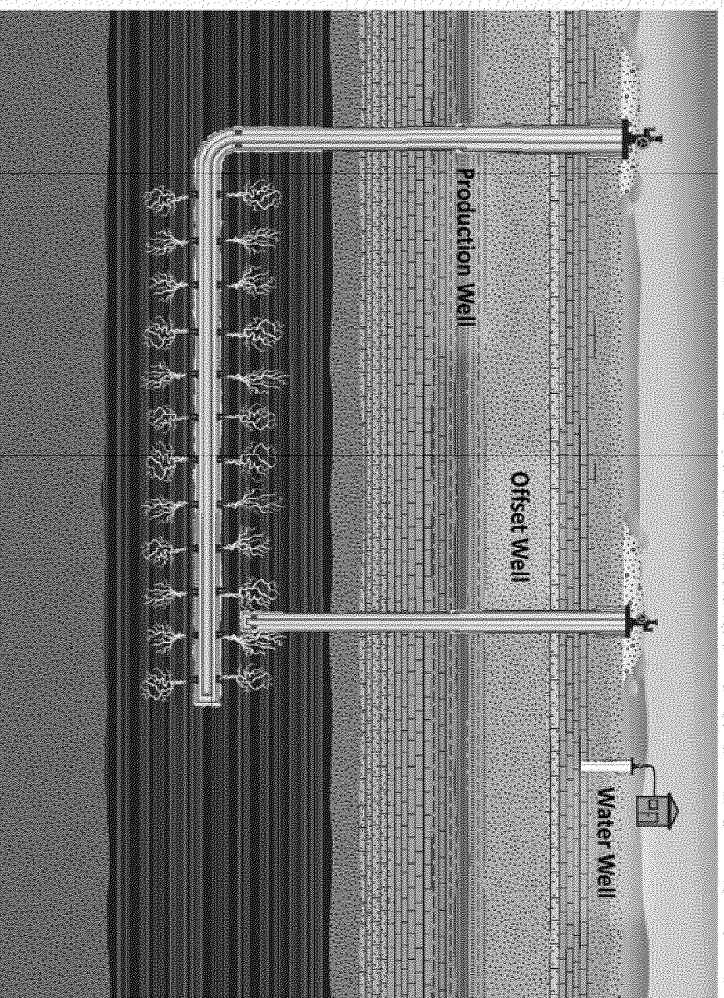
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**To:** Solomon, Sarah[Solomon.Sarah@epa.gov]  
**From:** LeDuc, Stephen  
**Sent:** Tue 5/19/2015 4:00:54 PM  
**Subject:** FW: HFDWA: Revised Executive Summary  
[HFDWA - Executive Summary 20150510 jbf WISER clean.docx](#)  
[ATT00001.htm](#)

Can you bring in these comments from Nathan—don't make any of the changes just bring them in. Some might not be applicable anymore b/c they were on an earlier draft.

**From:** Frithsen, Jeff  
**Sent:** Monday, May 18, 2015 1:34 PM  
**To:** Burden, Susan; Frithsen, Jeff; LeDuc, Stephen; Ridley, Caroline  
**Subject:** FW: HFDWA: Revised Executive Summary

Note – additional comments on the ES from Nathan. This is on our previous version.

Jeff

Jeff Frithsen

USEPA-ORD-NCEA

703-347-8623 (office phone)

**From:** Briskin, Jeanne  
**Sent:** Monday, May 11, 2015 4:53 PM  
**To:** Frithsen, Jeff  
**Subject:** Fwd: HFDWA: Revised Executive Summary

pls include these edits/comments too  
Begin forwarded message:

**From:** "Wiser, Nathan" <[Wiser.Nathan@epa.gov](mailto:Wiser.Nathan@epa.gov)>  
**To:** "Briskin, Jeanne" <[Briskin.Jeanne@epa.gov](mailto:Briskin.Jeanne@epa.gov)>  
**Subject: RE: HFDWA: Revised Executive Summary**

Hi Jeanne,

I made some additional comments/suggestions.

Nathan Wiser, Environmental Scientist  
Office of Research and Development, Office of Science Policy  
303-312-6211 office  
[wiser.nathan@epa.gov](mailto:wiser.nathan@epa.gov)

mailing address:  
EPA Region 8 (8ENF-UFO)  
1595 Wynkoop Street  
Denver, CO 80202

From: Briskin, Jeanne  
Sent: Monday, May 11, 2015 5:33 AM  
To: Wiser, Nathan  
Subject: Fwd: HFDWA: Revised Executive Summary

Please let me know if there is anything not true or otherwise intolerable in here. Thanks!

Begin forwarded message:

From: "Frithsen, Jeff" <[Frithsen.Jeff@epa.gov](mailto:Frithsen.Jeff@epa.gov)<<mailto:Frithsen.Jeff@epa.gov>>>  
Date: May 10, 2015 at 9:03:34 PM EDT  
To: "Burke, Thomas" <[Burke.Thomas@epa.gov](mailto:Burke.Thomas@epa.gov)<<mailto:Burke.Thomas@epa.gov>>>, "Kavlock, Robert" <[Kavlock.Robert@epa.gov](mailto:Kavlock.Robert@epa.gov)<<mailto:Kavlock.Robert@epa.gov>>>, "Kadeli, Lek" <[Kadeli.Lek@epa.gov](mailto:Kadeli.Lek@epa.gov)<<mailto:Kadeli.Lek@epa.gov>>>  
Cc: "Briskin, Jeanne" <[Briskin.Jeanne@epa.gov](mailto:Briskin.Jeanne@epa.gov)<<mailto:Briskin.Jeanne@epa.gov>>>, "Gibbons, Dayna" <[Gibbons.Dayna@epa.gov](mailto:Gibbons.Dayna@epa.gov)<<mailto:Gibbons.Dayna@epa.gov>>>, "Matthews, Lisa" <[Matthews.Lisa@epa.gov](mailto:Matthews.Lisa@epa.gov)<<mailto:Matthews.Lisa@epa.gov>>>, "Teichman, Kevin" <[Teichman.Kevin@epa.gov](mailto:Teichman.Kevin@epa.gov)<<mailto:Teichman.Kevin@epa.gov>>>, "Zambrana, Jose" <[Zambrana.Jose@epa.gov](mailto:Zambrana.Jose@epa.gov)<<mailto:Zambrana.Jose@epa.gov>>>  
Subject: HFDWA: Revised Executive Summary  
Tom:

The latest version of the executive summary is attached. With your approval, we can pass it along to the administrator and others in the AO tomorrow morning.

We didn't get to everything on our tick list for the executive summary and will be working on further refinements during the week. However, it is coming along well.

Enjoy – all comments welcome!

Jeff

Jeffrey B. Frithsen, Ph.D.  
National Center for Environmental Assessment  
Office of Research and Development  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, SW (8623-P)  
Washington, DC 20460  
703-347-8623 (office phone)

Physical Office Address/Overnight Deliveries  
Two Potomac Yard (North Building), Room N-7741  
2733 South Crystal Drive, Arlington, VA 22202

**To:** Solomon, Sarah[Solomon.Sarah@epa.gov]  
**From:** LeDuc, Stephen  
**Sent:** Tue 5/19/2015 3:49:43 PM  
**Subject:** FW: HFDWA: Executive Summary - Page ES-14

Can you bring these comments into the ES. See my note. Thanks! Steve

**From:** LeDuc, Stephen  
**Sent:** Tuesday, May 19, 2015 11:49 AM  
**To:** 'Shari Ring'; Frithsen, Jeff; Burden, Susan; Ridley, Caroline  
**Subject:** RE: HFDWA: Executive Summary - Page ES-14

Hi all,

I agree with Shari's edits, except Ex. 5  
Ex. 5 Other than that I'm OK with these. Best, Steve

**From:** Shari Ring [mailto:Shari.Ring@cadmusgroup.com]  
**Sent:** Tuesday, May 19, 2015 7:14 AM  
**To:** Frithsen, Jeff; Burden, Susan; LeDuc, Stephen; Ridley, Caroline  
**Subject:** RE: HFDWA: Executive Summary - Page ES-14

My 2 cents below:

**Ex. 5**

**Ex. 5**

Shari Ring

The Cadmus Group, Inc.

703.247.6159

**From:** Frithsen, Jeff [<mailto:Frithsen.Jeff@epa.gov>]

**Sent:** Monday, May 18, 2015 11:21 PM

**To:** Shari Ring; Burden, Susan; Frithsen, Jeff; LeDuc, Stephen; Ridley, Caroline

**Subject:** HFDWA: Executive Summary - Page ES-14

We continue to get comments on how we refer to our example cases. This paragraph from the ES (page ES-14) received some comment from Jose.

**Ex. 5**

**Ex. 5**

**Ex. 5**

**Ex. 5**

**Ex. 5**

Jeff

**Ex. 5**

Jeffrey B. Frithsen, Ph.D.

National Center for Environmental Assessment

Office of Research and Development



U.S. Environmental Protection Agency

1200 Pennsylvania Avenue, SW (8623-P)

Washington, DC 20460

703-347-8623 (office phone)

Physical Office Address/Overnight Deliveries

Two Potomac Yard (North Building), Room N-7741

2733 South Crystal Drive, Arlington, VA 22202

**To:** Purchia, Liz[Purchia.Liz@epa.gov]; Geisler, Lindsey[Lindsey.Geisler@Hq.Doe.Gov];  
Aoife.Mccarthy@Hq.Doe.Gov[Aoife.Mccarthy@Hq.Doe.Gov]  
**From:** Allen, Laura  
**Sent:** Wed 6/3/2015 10:38:51 PM  
**Subject:** RE: Talking points on report **Ex. 5**  
HF Press Release(final).docx

## Ex. 5

**Ex. 5** If you could please keep a close hold on the info until then, that would be great.

Thank you!

Laura Allen

Deputy Press Secretary  
Office of the Administrator  
U.S. Environmental Protection Agency

Email: [Allen.Laura@epa.gov](mailto:Allen.Laura@epa.gov)

Office: 202-564-1175

## Ex. 6

Please consider the environment before printing this email.

**From:** Purchia, Liz  
**Sent:** Wednesday, June 03, 2015 5:59 PM  
**To:** Geisler, Lindsey  
**Cc:** Allen, Laura  
**Subject:** RE: Talking points on report

## Ex. 5

Yup, adding Laura who will share.

**From:** Geisler, Lindsey [<mailto:Lindsey.Geisler@Hq.Doe.Gov>]

**Sent:** Wednesday, June 03, 2015 5:57 PM

**To:** Purchia, Liz

**Subject:** Talking points on report

**Ex. 5**

**Ex. 5**

Thanks, Lindsey

Lindsey Geisler

Office of Public Affairs

Department of Energy

Office: (202) 586-4648

Blackberry:

**Ex. 6**

[lindsey\\_geisler@hq.doe.gov](mailto:lindsey_geisler@hq.doe.gov)

**To:** Purchia, Liz[Purchia.Liz@epa.gov]  
**From:** Benenati, Frank  
**Sent:** Wed 6/3/2015 9:25:44 PM  
**Subject:** RE: HF\_Draft Press Release (v13\_6 3 15).docx

You are an American patriot

**From:** Purchia, Liz [mailto:Purchia.Liz@epa.gov]  
**Sent:** Wednesday, June 03, 2015 5:23 PM  
**To:** Benenati, Frank  
**Subject:** RE: HF\_Draft Press Release (v13\_6 3 15).docx

**Ex. 5**

# Ex. 5

**From:** Benenati, Frank  
**Sent:** Wednesday, June 03, 2015 5:20 PM  
**To:** Purchia, Liz  
**Subject:** RE: HF\_Draft Press Release (v13\_6 3 15).docx

Ex. 6

Thanks – do you have topline talkers by chance?

**From:** Purchia, Liz [<mailto:Purchia.Liz@epa.gov>]  
**Sent:** Wednesday, June 03, 2015 5:17 PM  
**To:** Benenati, Frank; Vahlsing, Candace  
**Cc:** Allen, Laura; Reynolds, Thomas  
**Subject:** FW: HF\_Draft Press Release (v13\_6 3 15).docx

# Ex. 5

**From:** Allen, Laura  
**Sent:** Wednesday, June 03, 2015 5:12 PM  
**To:** Reynolds, Thomas; Purchia, Liz  
**Subject:** HF\_Draft Press Release (v13\_6 3 15).docx

Here is the latest press release with ORD edits and Tom's earlier edits.

**To:** Matthews, Lisa[Matthews.Lisa@epa.gov]  
**From:** Marks, Teresa  
**Sent:** Thur 5/14/2015 4:29:29 PM  
**Subject:** RE: Follow-up to state briefing on EPA's Draft Hydraulic Fracturing Drinking Water Assessment

Sounds good Lisa, but would you please add me to the person they can contact? Thanks

**From:** Matthews, Lisa  
**Sent:** Thursday, May 14, 2015 11:19 AM  
**To:** Marks, Teresa  
**Subject:** Follow-up to state briefing on EPA's Draft Hydraulic Fracturing Drinking Water Assessment

Hi Teresa,

Attached is the draft note I'm planning to send to the state participants for our R8 and R6 briefings.

Ex. 5

Ex. 5

Thank you,

Lisa

---

Ex. 5



# Ex. 5

Regards,

Lisa Matthews

Senior Advisor – State Engagement

US EPA Office of Research and Development

202-564-6669 office

**Ex. 6**

[matthews.lisa@epa.gov](mailto:matthews.lisa@epa.gov)

**To:** Frithsen, Jeff[Frithsen.Jeff@epa.gov]  
**From:** Ridley, Caroline  
**Sent:** Fri 5/8/2015 9:54:31 PM  
**Subject:** FW: May 4 version of Chapter 2  
HFDWA - Chapter 2 20150508.docx

This one doesn't look as pretty as the others. And we need to add the material on refrac rates from OAR. Recommend you print with no comments.

Caroline

---

Caroline E. Ridley, PhD

Ecologist

US Environmental Protection Agency

Office of Research and Development

National Center for Environmental Assessment

Office: (703) 347-8506 and

**Ex. 6**

**From:** Ridley, Caroline  
**Sent:** Friday, May 08, 2015 9:32 AM  
**To:** 'Jonathan Koplos'  
**Cc:** Anna Weber  
**Subject:** RE: May 4 version of Chapter 2

Had to change footnote definition of conventional reservoir to match with glossary and water availability modeling report.

See attached.

Caroline

---

Caroline E. Ridley, PhD

Ecologist

US Environmental Protection Agency

Office of Research and Development

National Center for Environmental Assessment

Office: (703) 347-8506 and

**Ex. 6**

**From:** Jonathan Koplos

**Ex. 4**

**Sent:** Thursday, May 07, 2015 11:56 PM

**To:** Ridley, Caroline

**Cc:** Anna Weber

**Subject:** RE: May 4 version of Chapter 2

Thank you.

Talk tomorrow.

**From:** Ridley, Caroline [<mailto:Ridley.Caroline@epa.gov>]

**Sent:** Thursday, May 07, 2015 9:19 PM

**To:** Jonathan Koplos

**Cc:** Anna Weber

**Subject:** RE: May 4 version of Chapter 2

Jonathan,

Here's another cleaned up draft. There are just a handful of tid-bits to add, in addition to the references.

Will send an invite for tomorrow morning.

Caroline

---

Caroline E. Ridley, PhD

Ecologist

US Environmental Protection Agency

Office of Research and Development

National Center for Environmental Assessment

Office: (703) 347-8506 and **Ex. 6**

**From:** Jonathan Koplos **Ex. 4**

**Sent:** Thursday, May 07, 2015 5:24 PM

**To:** Ridley, Caroline

**Cc:** Anna Weber

**Subject:** RE: May 4 version of Chapter 2

She did have good edits.

Any time tomorrow in your time frame works for me.

**From:** Ridley, Caroline [<mailto:Ridley.Caroline@epa.gov>]

**Sent:** Thursday, May 07, 2015 4:17 PM

**To:** Jonathan Koplos

**Cc:** Anna Weber

**Subject:** RE: May 4 version of Chapter 2

**Ex. 5**

**Ex. 5**

Caroline

Caroline E. Ridley, PhD

Ecologist

US Environmental Protection Agency

Office of Research and Development

National Center for Environmental Assessment

Office: (703) 347-8506 and

**Ex. 6**

**From:** Jonathan Koplos

**Ex. 4**

**Sent:** Thursday, May 07, 2015 3:45 PM

**To:** Ridley, Caroline

**Cc:** Anna Weber

**Subject:** RE: May 4 version of Chapter 2

Here is Chapter 2, pre-formatting.

Some details/edits still pending, including the re-frac details, yes.

I'll have time tomorrow morning as well to help finish this up.

Jonathan

PS Anna, this is straight from our SP.

**From:** Ridley, Caroline [<mailto:Ridley.Caroline@epa.gov>]  
**Sent:** Thursday, May 07, 2015 2:29 PM  
**To:** Jonathan Koplos  
**Cc:** Anna Weber  
**Subject:** RE: May 4 version of Chapter 2

So what's the current status on chapter 2? I have a couple hours this afternoon and a couple hours tomorrow morning to help work through remaining issues- mainly the re-frac stuff, right Jonathan?

Caroline

---

Caroline E. Ridley, PhD

Ecologist

US Environmental Protection Agency

Office of Research and Development

National Center for Environmental Assessment

Office: (703) 347-8506 and

**Ex. 6**

**From:** Ridley, Caroline  
**Sent:** Tuesday, May 05, 2015 11:29 AM  
**To:** 'Jonathan Koplos'  
**Cc:** Anna Weber  
**Subject:** RE: May 4 version of Chapter 2

Jonathan,

**Ex. 5**

Thanks!

Caroline

---

Caroline E. Ridley, PhD

Ecologist

US Environmental Protection Agency

Office of Research and Development

National Center for Environmental Assessment

Office: (703) 347-8506 and AWL (Fridays): (703) 362-5955



**From:** Jonathan Koplos

**Ex. 4**

**Sent:** Monday, May 04, 2015 1:59 PM

**To:** Ridley, Caroline

**Cc:** Anna Weber

**Subject:** May 4 version of Chapter 2

Hi Caroline,

Here is Chapter 2 address essentially all the JF/JB/AO comments.

I've annotated all those comments and how they were addressed.

I have not made any edits to the well count section.

Please let me know if you have any questions.

Jonathan

PS Anna, HERO details are noted in comment bubbles with (surprisingly) HERO.

---

Jonathan Koplos, Ph.D.

The Cadmus Group, Inc.

100 5<sup>th</sup> Avenue, Suite 100

Waltham, MA 02451

Ph. 617-673-7184

**Ex. 6**

[www.cadmusgroup.com](http://www.cadmusgroup.com)

Follow us on social media:

---

**From:** Burke, Thomas  
**To:** Burke, Thomas; Hanley, Mary; Pahl, Dale; Allen, Laura; Purchia, Liz; Frithsen, Jeff; Smith, Kelley; Teichman, Kevin; Briskin, Jeanne; Gibbons, Dayna; Matthews, Lisa; Guido.DeHoratiis@hq.doe.gov; druss@usgs.gov  
**CC:** Wiser, Nathan; Hauchman, Fred; Burden, Susan; Gant, Paula  
**Sent:** 5/15/2015 2:51:44 PM  
**Subject:** EPA / DOE HF Call

CT: Kelley Smith, Smith.Kelley@epa.gov<mailto:Smith.Kelley@epa.gov>

Notes: Holding this time for a call between DOE and EPA. We are looking for a list of other invitees and confirmation that this time will work from DOE.

On May 13, 2015, at 5:13 PM, DeHoratiis, Guido

<Guido.DeHoratiis@hq.doe.gov<mailto:Guido.DeHoratiis@hq.doe.gov>> wrote:

Paula would like to have a call on Friday to discuss the Assessment of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources so that she can prepare to brief our Secretary.

**Ex. 5**

**Ex. 5**

**From:** iox0@cdc.gov on behalf of Breyse, Patrick N. (CDC/ONDIEH/NCEH)  
**To:** 'Burke.Tom@epa.gov'; Gentry, Nathan; Knutson, Donna (CDC/OCOO/OCFO); Stephens, James W. (ATSDR/DCHI/OD); Qualters, Judy (CDC/ONDIEH/NCEH)  
**CC:** Burke, Thomas; Matthews, Lisa; Hauchman, Fred; Briskin, Jeanne; Frithsen, Jeff; Forrester, Tina (ATSDR/DCHI/OD); Balluz, Lina (CDC/ONDIEH/NCEH); Wolkin, Amy Funk (CDC/ONDIEH/NCEH); Wall, Patrick (CDC/ONDIEH/NCEH); Dignam, Timothy A. (CDC/ONDIEH/NCEH)  
**Sent:** 5/22/2015 3:19:21 PM  
**Subject:** Canceled: New EPA Report about Fracking

**Cancellation - please remove from your calendar.**

All – We were just notified that Tom Burke is unavailable for this Tuesday meeting now, and we are rescheduling again. We didn't want you to come in on Tuesday and be surprised that the date had moved again. Sorry for all the inconvenience.

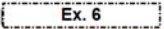
Donna Knutson, Ph.D.

**Deputy Director (Acting)**

National Center for Environmental Health

Agency for Toxic Substances and Disease Registry

Centers for Disease Control and Prevention – Atlanta, GA

CDC: 770.488.0673  [dbk2@cdc.gov](mailto:dbk2@cdc.gov)



---

**From:** DCRoomARN3530CFTB/DC-Ariel-Rios-AO  
**To:** Marks, Teresa  
**Sent:** 4/24/2015 9:22:07 AM  
**Subject:** Accepted: ORD HF Reports and Draft Assessment: Outreach Logistics

**Your request was accepted.**

---

Sent by Microsoft Exchange Server 2016

**DRAFT Notes Executive Committee Meeting**  
**Monday May 4, 2015**  
**4:00 pm – 5:00 pm**

**Attendees:** Dave Russ (USGS), Vivian Nolan (USGS), Larke Williams (EPA), Barbara Martinez (EPA), Kevin Teichman (EPA), Guido DeHoratiis (DOE), Lindsey VanDeBrook (DOE)

# Non-Responsive

## **EPA's Study of Hydraulic Fracturing and its Potential Impact on Drinking Water Resources Release**

The EPA just finished briefing the Executive Office of the President on its HF Drinking Water Study, including its HF Drinking Water Assessment. DOI and DOE representatives attended the briefing. The nature of the questions asked mostly focused around being clear on messaging. The assessment and remaining technical reports are scheduled to go out in spring 2015; at the moment, the Agency is targeting the end of May for the public release of these documents.

**Action:** Kevin will send Dave briefing charts from the briefing and cc Guido. **(Completed)**

**Other**

# Non-Responsive



# Non-Responsive